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MICHIGAN

STATE

FARMER'S INSTITUTES

WINTER OF 1902-1903

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LETTER OF TRANSMITTAL.

To the State Board of Agriculture:

Gentlemen—I have the honor to transmit herewith a report of the institute work carried on under your direction, during the year beginning July 1, 1902. This report includes:

The annual report of the superintendent.

A condensed report of the joint meeting of the annual Round-up Institute at Owosso.

Table showing the attendance at the county two-day, and the one-day institutes.

I respectfully recommend that this report be printed.

Respectfully submitted,

L. R. TAFT,

Superintendent Farmers' Institutes.

AGRICULTURAL COLLEGE, MICHIGAN,
June 30, 1903.

MAY 2 1904

REPORT OF SUPERINTENDENT.

President J. L. Snyder:

Sir—I herewith submit a report of the Farmers' Institutes for the year ending June 30, 1903. During the season, all of the county institutes heretofore organized have been maintained and two-day institutes were arranged for each of them. All of these were held, except one for Barry county which had to be given up on account of smallpox. For the same cause the institute in Allegan county was postponed until April and, owing to the late date, the attendance was quite small. The following counties organized institute societies during the year: Kalamazoo, Montmorency, Leelanau, Houghton and Baraga. The only counties in the lower peninsula that are without an institute society at the present time are Missaukee and Roscommon. During the season 210 one-day institutes were held in addition to the county two-day institutes. The statistics recording the attendance at the institutes are herewith submitted.

During the year, one hundred persons have given more or less time to the institute work. Some of these have spent eight or ten weeks in the field, but the average length of time has not been more than three or four and in a considerable number of cases the attendance has been limited to but one or two institutes. Of this number fifty were selected on account of their success as practical farmers and fruit growers. Twelve were women who talked on topics relating to the home and household matters. Sixteen were members of the faculty of the Agricultural College and twelve were from the State University. The Normal schools and Department of Public Instruction furnished six speakers upon topics relating to educational matters and six were members of the Forestry and Good Roads commissions. The members of the commissions and the others who are regularly in the employ of the State served without recompense except actual traveling expenses.

From the fact that during the months in which the institutes are held the faculty of the Agricultural College are not only busy with the regular students but have at the same time under their instruction some one hundred and fifty special students, it is practically impossible for them to give much time to institute work without neglecting their

classes, and the amount of assistance that they can render is much less than in former years.

The county organizations have been of great help in making arrangements for the meetings and, for the most part, the executive officers have done very satisfactory work. In some instances, however, the secretaries were deeply interested in politics and, on this account several of the institutes held in October and November did not receive the attention they needed and, hence, the attendance was somewhat reduced. In a few counties the work of the secretaries was hindered by sickness and other causes, but with few exceptions they did everything in their power to advertise the meetings and make them a success. Few persons understand or appreciate the amount of time that is required of a secretary of a county institute society who gives proper attention to the duties of his office.

The members of the Grange and Farmers' clubs throughout the State have taken an active interest in the institute work and by their attendance and participation in the exercises have done much to make them a success. The county papers have, in many instances, given a considerable amount of space for a number of weeks previous to the institutes in advertising them, and have thus aided in securing an attendance, and have also printed quite full reports of the proceedings.

There has been a considerable increase in the number of one-day institutes, especially in the northern counties, and in many cases the attendance has fully equaled that at the county Round-up Institute. This year the largest attendance at any one-day institute was at Ogden Center, Lenawee county, where there was a total of 1,375 for three sessions. The State speaker at this institute was N. P. Hull, of Dimondale, who also carried off the honors in 1901-2. The largest number, thirteen, of one-day institutes was held in Allegan county, with Lenawee a close second, with twelve institutes.

During the first week in January and third week in February, the weather was so stormy that it was practically impossible for any person living at a distance to attend the institutes. As the meetings during those weeks were held in counties that generally gave a large attendance, the effect was quite serious upon the numbers reported. The attendance at the one-day institutes during October and November was also considerably affected by the fact that comparatively few farmers had completed their work, and they were too busy getting ready for winter to attend the institutes.

Among the topics that attracted most attention during the winter was that of "The Centralized School Question." Owing to the deep interest taken in this subject by Prof. Delos Fall, superintendent of public instruction, and through the cooperation of his department, we were able to provide speakers for discussing it in nearly every county of the lower peninsula; the interest manifested at every point indicating that the farmers are anxious for light upon the subject. Among the other topics that received attention was that of "Good Roads," and in this we were

greatly assisted by several members of the Highway Commission of the State. Hon. H. S. Earle, Detroit, president of the commission, devoted several weeks to attending Farmers' Institutes and discussing this subject, and several other members attended one or more institutes. The State Forestry Commission also assisted at a number of institutes and aided in the presentation of this important subject.

Among the special features introduced at the institutes during the past winter were addresses upon "Diseases of Live Stock" and "Emergency Methods for the Farmer," by several of the leading veterinarians of the State. Various phases of "Farm Law" were discussed at a number of places by members of the University Law School and other prominent attorneys. "Poultry Raising" and "Truck Gardening" also received attention and several of the speakers gave addresses on "Decoration of Home Grounds."

The special sections for women have been held as usual in a large number of counties. The work seems to be growing in favor and the only objection that has been heard to holding a women's section has been that the men also wished to hear the women speakers and wish them placed on the program at the regular sessions. The difficulty has been met by placing the women speakers on the regular program for one or two short talks and then providing a women's section for the discussion of topics relating to domestic economy. These meetings are held on the afternoon of the second day while the subjects relating to livestock husbandry are being considered in the regular institute.

Early in the winter an invitation was received from the Owosso Grange and a number of the leading citizens to hold the State Round-up Institute in that city. Arrangements were accordingly made to hold it in cooperation with the Shiawassee County Institute Society, on February 24-5-6-7. A liberal appropriation was made by the city council for the purpose of defraying the expenses of hall rent, music, printing, etc., and President A. L. Chandler, of the institute society, and members of the local committee did everything in their power to make the meeting a success.

Owing to the large number of topics that seemed to demand attention, it was thought advisable to arrange for a number of sections, at which various topics could receive attention from a technical standpoint, after having been presented at one of the general sessions. Special sessions for Sugar Beet Culture, Good Roads, and Country schools were thus arranged, as were two sessions of a Women's Congress.

From the fact that comparatively few persons could reach Owosso in time for the morning session of the first day, a large attendance was not expected, but from that time until the close of the institute the attendance was all that could be asked and, during some sessions, the capacity of the large armory was severely taxed. As will be seen from the appended papers, a splendid array of talent was presented. Among the speakers from other states were Prof. John Craig, of Cornell University, who gave addresses on "The Care of the Apple Orchard" and "The Decoration of Home and Public Grounds;" Hon. James H. MacDonald,

of Hartford, Conn., State Road Commissioner, who discussed "Road Instruction and State Aid;" Prof. Chas. S. Plumb, of the State University, Columbus, Ohio, who talked on "The Dairy Cow" and "Profitable Pork Production," and Prof. Orville T. Bright, of Chicago, who gave an illustrated lecture on "Rural Schools as They Are and as They Should Be," and also gave two talks before the County Teachers' Institute which formed one section of the Round-up. In addition to the assistance they rendered during the holding of the county institutes, President Angell and several members of the faculty of the State University showed their interest in the work of the Farmers' Institutes by attending the Round-up and delivering addresses.

On Wednesday and Thursday mornings, conferences of the State lecturers and the secretaries of the county institute societies were held, at which the details of institute work were discussed and arrangements made for continuing the work. The effect of these conferences cannot fail to be beneficial to all who took part in them.

During the last year, as has been the case previously, the railroads of the State have made it possible to extend the work of the Farmers' Institutes by offering reduced rates to the State lecturers and have increased the attendance at the Round-up Institute, by selling tickets at one fare for the round trip. These favors have resulted in a great benefit to the institutes and merit hearty commendation.

In closing, I desire to extend my thanks to the State speakers for the hearty cooperation they have given and, especially, to yourself and the faculty of the Agricultural College, President Angell and the faculty of the State University, President C. T. Grawn, of the Central Normal School, Prof. Delos Fall and his colleagues in the office of the State Department of Public Instruction, and the members of the Forestry and Highway commissions who have devoted so much of their valuable time to this work without recompense.

During the year, two persons who were among the pioneers in institute work in Michigan have passed away. Dr. R. C. Kedzie died in November, 1902, and Mrs. Mary A. Mayo in April, 1903.

Dr. Kedzie was one of the first to propose the holding of Farmers' Institutes and took a prominent part in the first meeting. He was interested in the work and for many years devoted a considerable part of the winter vacation to attending these meetings. Each year he had some new subject which he had been investigating to present to the farmers and always received close attention.

Mrs. Mayo was the first woman speaker employed in the institute force in Michigan and was always a strong advocate of a special session for the women. For a number of years she devoted the winter months to attending Farmers' Institutes in Michigan and other states and many of her utterances are still household words.

L. R. TAFT,
Superintendent.

Michigan Agricultural College, June 30, 1903.

ROBERT CLARK KEDZIE.

Deceased, November 7, 1902.

ROBERT CLARK KEDZIE.

On the evening of November 7, 1902, the man who was often called the founder of the Michigan Farmers' Institutes, departed this life. Dr. R. C. Kedzie was born in Delhi, N. Y., January 28, 1823, and came with his parents in 1826 to Deerfield, Lenawee County, Michigan. His father dying soon after this, the mother was left with seven children to maintain the struggle of the pioneer life.

His training in the public schools was scanty but in 1840 he entered Oberlin College. After graduating from the classical course, he was principal of the Academy at Rochester, Oakland County, for two years, after which he entered the medical department of the University of Michigan and graduated with its first class in 1851. After practicing his profession for one year in Kalamazoo and for ten years in Vermontville, he served for a year in the civil war as surgeon of the Twelfth Michigan Infantry. In 1863 he was appointed to the chair of chemistry in the Michigan Agricultural College and retained this position for nearly forty years. In June, 1903, he was made professor emeritus. When the State Experiment Station was organized, in 1887, he was appointed chemist and a member of the council, which positions he retained until his death.

Professor Kedzie served as a member of the State Board of Health and his work in safeguarding the use of illuminating oils and investigating the danger from arsenical wallpaper, as well as in various other lines, will not soon be forgotten.

In 1863 he was given the degree of M. A. by Oberlin College; the Agricultural College in 1898 conferred the degree of D. Sc., and the University of Michigan, in 1901, bestowed upon him its highest honor, the degree of LL. D.

For the first sixteen years in the history of the Michigan Agricultural College, it labored under a great disadvantage, as the great farming community of our State knew nothing of what the college was trying to do for them and, on the other hand, the members of the college faculty lacked the stimulus which the practical farmer can impart by questions and suggestions to the scientific worker in laboratory and field.

At a meeting of the faculty, held May 7, 1875, Dr. Kedzie presented a resolution whose first sentence was: "Resolved, That a committee of three be appointed by the president to draw up a scheme for a series of Farmers' Institutes to be held in different parts of the State during the next winter."

The institutes were sanctioned by the board, and the matter of their inauguration was placed in the hands of a committee consisting of Drs. Kedzie and Beal and Prof. Carpenter. The subject seemed a rather delicate one to handle. There were no precedents. Of their own motion the professors from the college could not invade a farming community and hold an institute, they must first be invited to come. However, there was no lack of invitations and, from the first, Farmers' Institutes were recognized as being mutual cooperative affairs in which the farmers themselves were to present at least half of the matter appearing on the pro-

gram, the workers from the college not being expected to give a course of lectures but simply to do half the work and bear their share in the discussions. They were called from the first "Farmers' Institutes," never College Institutes. Dr. Kedzie has been given the credit for founding the Farmers' Institutes in Michigan, as it was on his invitation that the work was entered upon.

Chemistry being such a practical science and so far-reaching in its applications, the range of topics discussed during the twenty-five years of his connection with the institutes is greater than that of any other worker.

The first topic discussed by Dr. Kedzie at an institute (Allegan, Jan. 11-12, 1876) was "Swamp Muck." This was followed at other institutes by papers on Lightning Rods, Land Plaster, Green Manuring, Illuminating Oil, Healthy Homes for Farmers, Relative Value of Different Varieties of Michigan Wheat, Agricultural Capabilities of the Soils of the Northern Counties of the Lower Peninsula, Comparative Food Value of Certain Varieties of Indian Corn and Millstuffs, Salt in Agriculture, Food Value of Yellowed and Sound Peaches, Relations of Chemistry to Agriculture, Ripening of Wheat, Source of Nitrogen for Plants, Manures for the Farm, Rotation of Crops, Agricultural Problem of the Plains, A Word About Water, Sugar from Beets, Methods of Testing Wheat Flour, Wheats for Michigan, Rainfall and Frost in the Fruit Belt, Simpler Chemistry of the Farm, Feeding the Soil, Relation of the Factory to the Farm in the Beet Sugar Industry, The Soil from the Chemist's Standpoint.

In the choice of topics for his talks Dr. Kedzie aimed to select those subjects which would develop the most discussion and involve practical questions. The address which was the most of a popular character was that upon "Healthy Homes for Farmers." A ten years' experience in Eaton county had made the doctor familiar with the unsanitary conditions which surrounded many farmers' homes and his clear and witty explanations of the "many mysterious visitations of Providence," the cause traceable to improper locations of wells, barns and outhouses, left a strong impression upon his hearers.

At one institute the doctor was asked "just when is the best time to cut wheat?" A very plain, simple question, but to answer it from actual knowledge of facts required Dr. Kedzie and the workers in the chemical laboratory to analyze twenty-one samples of wheat cut from the same field, each sample taken twenty-four hours later than the preceding one.

If space permitted I could enumerate many other simple (?) questions propounded at the institutes which involved an equal amount of work and investigation to answer. The influence, therefore, of the institutes on Dr. Kedzie's life and work as a scientist was fully as great as that which he brought to bear upon the numerous farmers whom he met face to face in the institute audiences throughout Michigan.

In all the fields of endeavor in which he labored so long and earnestly none loved he more than that of the Farmers' Institutes, and of the honors and titles which were conferred upon him by the institutions of this State, no honor prized he so highly as being called "the founder of the Michigan Farmers' Institutes."

MARY A. MAYO.

Deceased, April 21, 1903.

MARY A. MAYO.

The name of Mary A. Mayo must henceforth be conspicuous in any account, however brief, of the development of Farmers' Institute work in Michigan as being the pioneer conductor of the women's section. It was she suggested the direction the work should take along this line and she presided over the trial series, paving the way for what has proved to be a most helpful and popular feature of the present system of institutes in the State.

All her life she had been the friend and advocate of a broader and happier life for women in farm homes. She knew their needs in all the "nooks and corners" of the State where this movement sought to find and help them. For, born on a farm (in 1845, seven miles from Battle Creek) at twenty she had married Mr. Perry Mayo, whom three years before she had sent out to the civil war, and settled on a farm across the road from her parents. Here in a log house began her acquaintance with the details of difficulties and advantages that come with mothering a family in a farm home of limited means. Her horizon was never allowed to be bounded by the walls of her own house. Her heart and interest were always with that of humanity at large and with that amid farm environments particularly. Early she and her husband were active in the social, mental and religious life of the neighborhood, county and State.

Their connection with work outside their home county dates mainly from 1883. Although for the past two years Mrs. Mayo has left her home but a few times, she has aided in the general work for country people by correspondence and contributions to farm periodicals. Probably for all or nearly all of these twenty years she has held a commission from the State Grange as a deputy lecturer which carried with it authority to organize and instruct new Granges. In 1885 she reported having delivered fifty lectures in Michigan and Ohio under auspices of granges; in 1886, seventy-three in Michigan; in 1887, forty-eight in Michigan and two in Indiana. This was the record of the beginning of her public work.

Her interest in agricultural education was deep and practical. Her only son was a graduate of Michigan Agricultural College, while her voice and pen were used for years toward securing provision at that college for girls also. When that end was finally accomplished, in the dedication of the Woman's Building, her joy was too keen for words.

This is somewhat of the experimental foundation upon which was based Mrs. Mayo's distinctive work for farm women through the Farmers' Institutes, when, in 1895, the scope of the work was enlarged through increased appropriation. Mr. K. L. Butterfield, then superintendent, broached the feasibility of holding separate sections for women to Mrs. Mayo and, upon her approval, asked her to lead the work. Several years later, when asked how the plan suggested by Mr. Butterfield, had appealed to her at first, she said: "My heart just throbbed. It was what I had long wanted to do. He asked me what I would talk about. They were strong subjects that I suggested and I know we discussed the matter of how they would be received but it was decided to try it.'

Mrs. Mayo chose for her first topics at these meetings, "Mother and Daughter" and "Making Farm Work Easier." She spoke usually without notes, talking simply and directly from her heart and experience, face to face with those who came to hear her. The results surprised the most sanguine. The meetings for women proved unique and far-reaching.

The first of the Women's Sections was held at Kalkaska, November 14, 1895. Afterward when asked what convinced her of the use of the separate meeting for women, Mrs. Mayo instanced this first meeting. "I shall never forget it," she said. "They gave us a little reading room with but few chairs. I really questioned myself if anyone would come. Twice we had to send out for more chairs. I stated the object of the meeting, all the time watching my audience, trembling. They listened, quietly. On a few of the older womens' faces I saw tears. I talked for half an hour, when some school girls came in. Then I talked to them, kindly, tenderly, and sat down feeling my meeting had been almost a failure. But a beautiful old lady (with large golden earrings and a gay blanket shawl) came up to me, put her arms around me so tenderly and kissing me said, 'If I could have heard such a talk as that forty years ago I should have been a better mother.'"

Reports show that 5,309 women attended Mrs. Mayo's sections that first year at twenty institutes, including the State meeting. In 1896-7 she attended forty-five institutes: in 1897-8, twenty-eight; in 1898-9, eighteen; and in 1899-00, twelve. Each year she presided at the Women's Section of the Round-Up. All through her service she addressed the general institute sections, usually in the evening, once or twice at each place. No account is made of these addresses. It seems, however, fair to estimate that her audiences averaged two hundred a day, taking her work all through.

Her topics, added as the work grew, were "The Well Bred Child," "Home Life on the Farm," "Poultry Raising for the Farmer's Wife," "How to Keep the Boys on the Farm," "Mother and the School," "The House We Live In," "The Unappreciated Side of Farm Life," "The Mother's Greatest Need," "Wifehood and Motherhood," and "Mother and Children."

The extreme and prolonged illness of her daughter forced Mrs. Mayo to gradually forego an active part in promoting those undertakings so dear to her for the advancement of the rural people and to assist them chiefly by counsel and encouragement. Bravely, with an indomitable courage characteristic of so noble a nature as hers, she stood day and night at the post of her nearest duty as now revealed to her. For months, without a sign to others, she fought against the inroads upon herself of an incurable malady, giving up her place at her daughter's bedside only three weeks before transition came to her own dauntless spirit, April 21, 1903.

Thus lived among, and thus has gone before, the farm women of Michigan one who was affectionately known as "Mother Mayo." Not by her many years was the title won, but by the shedding abroad of a sympathetic, dignified womanliness that constantly suggested the highest type of motherhood.

J. B.

REPORT OF THE ROUND-UP INSTITUTE, OWOSSO, MICHIGAN, FEBRUARY 24-27.

The meeting was called to order in the Owosso armory on Tuesday morning by President A. L. Chandler, of the Shiawassee County Institute Society. In his introductory remarks he referred to the great value of the Farmers' Institutes in bringing the people together to discuss topics that are of interest to all, and spoke of the prejudice that formerly existed against the institutes, but which has now almost entirely passed away. He extended a hearty welcome to all visitors and promised that the people of Owosso would do all in their power to make their stay in town a pleasant one.

The general subject for discussion on Tuesday forenoon was the sugar beet industry and the relations between the grower and the factory. The first topic considered was:

FACTS AND FIGURES REGARDING BEET SUGAR MANUFACTURE.

BY F. R. HATHAWAY, ALMA, MICHIGAN.

(Abstract.)

During the last five years more than twenty sugar factories have been erected in Michigan, which are backed by an average capital of half a million dollars. The law requires that four dollars and fifty cents shall be paid for each ton of beets that shows 12 per cent of sugar and thirty-three and one-third cents for each additional per cent. The managers of the factory have each year sent out their canvassers and have endeavored to secure a sufficient acreage to provide beets for a run of a hundred days. As a rule, they have failed to secure this, although, as was the case this year when the Caro factory secured 65,000 tons, this limit is occasionally reached. The average for the six hundred ton factories has not been more than 35,000 tons annually. Were it so that the factories could secure a sufficient quantity of beets to allow them to run one hundred days at their full capacity they could afford to pay a somewhat larger price, but $4.50 per ton for 12 per cent beets is all that can be paid under present circumstances. That this is the case will be seen from the following figures which have been taken from the books of the Alma factory and which are a fair average for the other factories this season. They are based upon a 600 ton factory

and upon a product of two hundred pounds of sugar from each ton of beets, and a run of 40,000 tons of beets. Whatever the size of the factory, or whoever erects it, the cost is not far from $1,000 for each ton of daily capacity. This would make the factory cost not less than $600,000. One-half of this sum is generally secured from stock and the remainder by the issue of bonds.

The following represents the cost of running the factory for one year: Taxes, $13,119.37; insurance, $4,459.09; interest, $4,366.99; interest on bonds, $15,000; labor and salaries, $64,600; beets, 40,000 tons at $5.00, which has been the average price paid per ton, $200,000; coal, $21,600; lime rock, $5,400; coke, $2,016; barrels for eight million pounds of sugar, which has been the average output, $9,660; sulphur, acids, chemicals, tools, etc., $7,250. Total expenses for running the factory, $347,471.45.

The receipts will be as follows: White sugar, $352,000; brown sugar, $9,000; molasses, $3,000; total, $364,000. The amount left for depreciation on plant and interest on investment is about $16,500. This will be no more than the bare return for the money invested by the stockholders and will not leave anything for depreciation in machinery and buildings. This is always very great, especially as it frequently becomes necessary to substitute new and expensive machinery for that of the past.

Under the present conditions, the factory cannot afford to raise the price of beets, and, in fact, cannot even afford to pay the present price. Unless the farmers increase their acreage some of the factories will be closed and the product worked up by the others.

At the present time, the solution of the acreage question that seems most probable is for the companies to lease or buy large tracts of land and raise their own beets.

THE RELATION OF THE FACTORY TO THE FARMER.

BY PERRY G. TOWAR, LANSING.

If there is one person connected with the beet sugar industry who appreciates the friendly relations that ought to exist between the factory and the farmer, it is the agricultural superintendent. He is supposed to have a full general knowledge of the industry that he may be able to answer any question asked by the farmer. He must be able to explain in detail the most modern methods of growing beets, that the farmer may realize the greatest profit. He should be familiar with the cost of growing beets, as well as the cost of manufacturing sugar, that he may assist in the adjustment of the differences between the farmer and the factory. He should be in touch with all new improvements that tend to better the conditions. He is the go-between or peace-maker in his relations to both. Apparently he is double-faced or two-sided, for he must take the part of the farmer in discussing questions of policy

with the directors or management of the company, and on the other hand he must represent the factory and present their side when talking with the farmer. In fact he is the medium through which the most friendly relations between the factory and the farmer are made possible.

We have heard facts and figures from the factory's standpoint and following this comes the farmer's side of the question, while I am supposed to furnish the connecting link between the two to show the true relations between the producer of the raw material and the manufacturer of sugar. There can be no better illustration of the necessity of unity of action than to contrast the existing conditions with what should prevail.

The farmer, by the nature of his occupation, is possessed of a greater degree of independence than any other class. He is monarch of all he surveys. He owns and conducts his business as he wishes and will not be dictated to by anyone.

In the sale of all other agricultural products the farmer is subject to the dictation of the merchant or middleman, and is powerless to govern in any way the market price of his products, but here comes a product of the soil whose market is assured and price guaranteed, leaving only one chance to be taken by the farmer, and that is the yield. Surely here is an industry that deserves a more careful consideration on the part of the farmer.

In order to show the true relations that should exist between the factory and the farmer, let me call your attention to two reasons why each is interested in the success of the industry. First, and best of all, is the amount of money that can be made; second, the stability of the industry and its future prospects. The factory should have a fair remuneration for capital invested after all expenses are paid, and no one will deny it the right to this. The farmer must realize as much or more than he can from any other crop, or he will not engage in it. The farmer should be more interested than the factory for several reasons. It is manufacturing an article for consumption which is a necessity and a staple product. It brings the market nearer the farm. Instead of shipping the food products of our farms to foreign countries to feed the cheap labor which produces the sugar that we consume, it brings the consumer and producer into the closest relations possible, thus doing away with unnecessary expenses in commissions, freight and transportation charges. It brings more labor nearer the farm, which creates a greater demand for other products to feed that labor. It is producing an article that is not a direct competitor of any other farm product. It decreases the number of acres of other farm products and thus enhances their value. It is a cash crop, and besides produces a food for stock. It is not more exhaustive to the soil than other agricultural products. It is the only general product of the soil that has a guaranteed market and price. It is the most profitable crop and has the brightest prospects for being permanent and more profitable.

According to statistics of the Agricultural Department of the Secretary of State for the year 1901, gathered through the supervisors of the various townships, it is found that the average yield of wheat per acre is 12 bushels; corn, 35 bushels; oats, 31 bushels; potatoes, 100 bushels;

beans 14 bushels; rye 12½ bushels; hay, 1.18 tons; beets, 9.4 tons. The cost of producing an acre of each of these crops, figuring on the same basis of the price of labor in all cases and charging $5.00 an acre for the rent of land is as follows: Wheat, oats and rye, $12.00 per acre; corn, $14.50; beans, $17.00; hay, $9.20; potatoes, $20.00; beets, $35.25. This would make the cost as follows: Wheat, $1.00 per bushel; oats, 39 cents; rye, 99 cents; beans, $1.21; potatoes, 20 cents; hay, $8.00; beets, $3.75. If we do not charge the crop with the rent of the land, we find that the average profit of a crop of beets, according to the State statistics is $20.76. In order to have the gross income of other crops equal the net profit on beets, we find that wheat must sell for $1.72 per bushel; corn, 59 cents; oats, 67 cents; potatoes, 21 cents; beans, $1.48; rye, $1.66; and hay, $17.60. What better evidence do we need to prove that beets are the most profitable crop that can be raised on the farm?

There is practically nothing to lose so far as a permanent investment is concerned. The capital the farmer has invested can be turned to other purposes, while the factory's capital invested is practically useless for any other purpose. Taking all of these things into consideration, and this being purely an agricultural industry, it becomes vitally important that the farmer use his best endeavors to overcome the objections and help to solve the problems that stand in the way of increased profits and future development. The farmer and the factory are mutually interested in the success of this industry. The factory cannot exist and do business without the support of the farmer. The farmer can exist but not so well without the factory. If the farmer gets a large yield, the factory gets it. If the farmer raises a high per cent of sugar, the factory gets it, and it costs no more to put through a ton of beets containing 16 per cent of sugar than it does a ton containing 12 per cent. One thousand farmers could raise two acres each with an average of ten tons of beets per acre of a high content of sugar, making 20,000 tons of beets worth $5.00 per ton, or $100,000.00. If the cost of raising is $60,000.00, the profits would be 66 2-3 per cent to the farmer, while the factory would lose money. The farmer can make a profit on one acre, but the factory must have thousands of acres with a good yield to pay a profit. We are all anxious to see the factory make a profit, for the price the factory can pay for beets depends entirely upon the profits they can make, and the profits that the factory can make depends upon the quantity, test and purity of beets received, and the general expenses of conducting the business. If the factory could be assured that it would have enough beets to run its full capacity, it could pay a higher price to farmers. If the factory could know that the sugar content and purity would be high, it could pay more for beets. The situation resolves itself into a mutual partnership where the interests of each are identical; the success of the one tends to make the success of the other. They should join hands and work for the common good of the industry. There should be more intimate relations between them. The factory should take pleasure in extending every courtesy in its power, taking particular pains to explain in detail that part of the factory which is of a pecuniary interest to the farmer, and thus inspire confidence. The farmer has so often been the victim of scheming vultures that he takes for granted that everything

presented to him for consideration is against his interest and he opposes it on general principles; thus making the farmer the most suspicious class in existence.

If farmers would send in their contracts voluntarily by mail, if they would raise the beets without assistance from the factory in any way, if they would cooperate with the factory in reducing expenses all along the line, more could be paid for beets. It is entirely wrong for the factory to be obliged to hire men to solicit acreage from the farmer, for he virtually pays the bill, just as the expenses and salaries of binder men are paid by the one who purchases a machine.

It is usual for the farmer to receive pay for the products of his farm before or at the time they leave his possession. It is the lack of confidence, which is a result of ignorance of business methods, that gives employment to the grain buyers, all of whom are supported by the farmer. The average farmer does not realize the amount of money he is paying indirectly. I have often been asked this question: "Why should we pay freight on beets? We don't on anything else." The freight as well as all other expenses are paid by the farmer. These apparent difficulties in handling beets can be easily overcome by education just as they have in handling milk in the creamery. The milk leaves the farm and is hauled or shipped to the creamery, inspected, tested and paid for the same as beets, and, little fault is found. If the farmer wished it inspected, weighed, tested and paid for at his farm, he surely would not get as much for his milk. The farmer should be more anxious than the factory to bring the cost down to the minimum, for then will he get the highest price for beets.

Absolute confidence should exist between the factory and the farmer. Every farmer should be honest and just in his dealings with the factory, and any factory that would take advantage of a farmer in any way does not deserve to have a beet grown for it. But neither should condemn the other without proving beyond a question of doubt that all is not right, for let me say to you that it is the easiest thing in the world to be mistaken. I have known of eight tons of dirt being left in a car after taking out its first load of beets. It is not necessary for the farmer to weigh such a car to know that the factory weight is less than the actual amount put into the car. Several sample baskets full of beets taken from a car will vary in test and tare, but the average should be the average of the car. A sample from a wagon load may not fairly represent the load, but the average of several loads should be the average of the field.

The farmer is usually the victim of every new scheme or fraud that is perpetrated upon the public and it is conceded by some that he is usually an easy mark, at least he has been preyed upon until he does not distinguish between the kid glove stranger who offers something for nothing, and the incorporated company that invests a million dollars in a plant which is to build up an industry in his vicinity that will bring, not something for nothing, but something for his efforts; that a one-million dollar plant is so much insurance that the farmer is going to be fairly treated and receive his just reward.

THE FARMERS' SIDE OF THE BEET SUGAR INDUSTRY.

BY COLON C. LILLIE, COOPERSVILLE.

I am deeply interested in the sugar beet industry, because it means so much to the American farmer and American agriculture. The competition is such that the staple agricultural products, wheat, corn, oats, etc., sell very close to the cost of production. Every acre of land devoted to sugar beets reduces the acreage of these staple crops just so much and helps to relieve the pressure on the market. When we grow beets and sell them we are putting a product on the market that does not come in competition with any other crop that we raise. If we did not produce the beets to make the sugar, we would have to send the money to the old world for the sugar. If we produce the beets we can keep this money at home and get a better price for the staple products we grow. While we produce less of the other products in consequence of having grown beets, it is believed the better price for these products resulting from growing a less amount, will make their total value nearly if not quite as much as though beets were not grown as a crop and all the land devoted to staple products. Hence the beet crop, up to the total amount needed for our home consumption, will be a clear gain to American agriculture.

Again, at present prices, even, if we learn how to grow good crops, the beet crop is profitable. I believe it to be on the average more profitable for the farmer to grow sugar beets than to grow almost any other crop. Taking these things into consideration, I believe it is the duty of every farmer who lives within the proper distance of a factory and who has suitable land, to grow a certain amount of sugar beets every year. He can get a good profit for his labor and land and he helps prevent overproduction of the staple crops.

The labor question.—Many are prevented from growing beets from the fact that the necessary labor cannot be secured to care for them and market them. This labor question is a great bug-bear. I was afraid of it at first, but I found that there was no trouble from this point. There are boys enough in every community to thin the beets and they are proud to earn the money. A good smart boy can thin as many beets in a day as a man. Then why not pay him as good wages as you would a man? If you will do this there will be no trouble in getting boys to work.

The greatest labor is in pulling and topping, and I believe this question is soon to be solved by the invention of a machine that will do this work fairly successfully.

The test.—There is a great deal of complaint about the testing of beets. Many farmers claim the factories are not always fair, or accurate. The trouble is that the farmers have no means of knowing whether they are fair or not. If some system could be devised so that the farmer

could know that he got his correct test there would be no cause of complaint. We ship the beets in faith and we accept the test in faith. It is not right. The grower should have some way so he may know that he is getting his just due. If this cannot be done, in my opinion the test will have to go and the beets be bought at a flat rate per ton. The manufacturer need not expect that farmers will take their word for the test and know nothing about it. Turn the tables and they would not submit to such a proposition for a moment. Some one may yet devise a method so the farmer can test his beets as easily as he can now test his cows. Then he can keep tab on the factory. If nothing of this sort happens then it will not be many years before beets are not bought by the test.

The tare.—This is another bone of contention between the grower and the manufacturer, and the dissatisfaction comes from the same reason that it does in the test. The farmer has no way of checking the work of the factory. He must accept its figures in good faith and ask no questions. I believe most if not all the manufacturers are honest, but this does not alter the proposition. The principle of the thing is wrong. No business has ever prospered and none ever will prosper for any length of time in America, where both parties to a transaction have not the means of knowing whether the business is done right or not. The American farmer wants to know whether he is getting what belongs to him or not, and it is proper he should. He may submit to such a thing long enough to try a new industry, but he will not support an industry long on this principle. Some one must devise a better system. Many farmers are suspicious that they have not been treated fairly in this matter of tare, and there are some instances where the factory has not been above suspicion. A certain party last year produced three car-loads of beets. Owing to the wet condition of the ground they were all dirty. One car was washed and then all were sent to the factory. Strange to say, the per cent of tare was alike for each car. How would the factory account for this? My belief is that a majority of the farmers, favorably situated as to soil and convenient to a sugar factory, wish to grow beets. They believe in it, but they want some way of knowing that they are treated fairly as to test and tare.

If the sugar beet industry could be so arranged that the farmer could deliver his beets at his nearest station, and right then and there have his test and tare settled, there would be no trouble in getting acreage for all the factories. Why could not the factory handle beets as potatoes are now handled? Have the price per ton agreed upon and then settle the tare right there with the farmer.

Perry G. Towar. Beets are sampled for tare in the same manner whether they are taken from wagons or cars. The man who unloads them fills a basket with a fork and does not have an opportunity to pick out beets that will have a high per cent of tare. If the farmers wish a flat rate for their beets, the factories will give it to them and if a weighing and tare station at points where large amounts of beets are shipped will give better satisfaction than the present arrangement, this can undoubtedly be arranged for.

Wm. McKay, Kawkawlin. There is as much difference in the per cent of starch in potatoes and in the quality of chicory as is found in the per cent of sugar in beets. The starch and chicory factories pay a flat rate and, if this is the case, it seems strange that the same thing cannot be done by beet sugar factories.

Another complaint that the growers make is that they do not receive prompt reports of their shipments. In other cases, short weights are reported, as when cars are filled with the certain amount of beets, it often happens that when reported, the weight is but 60 to 75 per cent of what was weighed into the car.

The sugar beet industry has raised the cost of labor and this makes potatoes, oats and other farm products cost several cents more per bushel.

Mr. Atherton, of Clinton County. Have you ever used commercial fertilizers on the beets?

Colon C. Lillie. I have applied commercial fertilizer at the rate of five hundred pounds to theacre, at a cost of six dollars and a quarter. This increased the yield four and seven-tenths tons per acre, or about $25.00 worth of beets were secured by the use of $6.25 worth of fertilizer. The fertilizer may be applied broadcast, or may be sown with a grain drill with the seed.

Creamery tests of milk run about the same and patrons seldom have cause to complain, but beets vary both in test and tare when grown under the same conditions, and until some method can be devised by which the farmers are satisfied that they are not being cheated, there will be dissatisfaction on the part of the growers.

During the two years that I have grown beets, I have hauled them to the cars with my regular teams and men without extra expense, so that I consider the usual estimate for this work of forty cents per ton to be clear profit.

On Tuesday afternoon a sugar beet section was held, with E. J. Cook of Owosso in the chair. The topics considered related to the growing and handling of the crop. The following papers were submitted:

THE SOIL FOR THE BEET FIELD—ITS PREPARATION AND PLANTING.

BY COLON C. LILLIE, COOPERSVILLE.

Not all soils are adapted to the best development of the sugar beet. Hard clays, light sands and muck soils should be avoided. Beets will not do well on any of them. A sandy loam with enough clay to hold moisture will probably be the best soil. A clay loam is good but a little hard to work. However, beets will grow on any good soil that will produce clover, wheat, and corn.

It is not good farming to grow beets on the same field year after year, hence they must be grown on every field of the farm in a rotation of crops. I am not fully satisfied yet just where the best crop should come in the rotation,—after corn, after oats or after clover. This is a question that can be determined only by experience in growing the crop for several years.

I am of the opinion that it will pay us to select portions of a field best adapted for beets for this crop and devote the portion not adapted to some other crop. The soil on many of our farms in Michigan varies so much in character from sand knolls to clay knolls that no one method will usually pay. We want a good crop of beets if we make them pay. There is such an expense for labor in this crop that a portion of the field not adapted to their growth will cut down the profits. Rough hilly portions of the farm should not be planted to beets because beet machinery cannot well be operated on this kind of land.

The preparation of the soil.—Extra pains must be taken to secure a good seed bed. The surface must be fine and mellow and free from lumps and clods. The land should be plowed deep and yet if the land has been plowed shallow it is not policy to plow deep all at once. The low subsoil turned up is not a good soil for beets. Better plow deep gradually bringing up a little of the subsoil at a time and allow this to thoroughly weather before more is plowed up.

Fall plowing is undoubtedly the best as it has a chance to weather during the winter but many of the best growers plow almost entirely in the spring. Spring plowing should be done as early as possible so the land may settle down and be in good shape to hold moisture.

In preparing the seed bed shallow cultivation is better than deep. It is not policy to loosen the ground to too great a depth. The surface should be fine but compact to insure germination. A float and a leveling harrow should be used in preference to deep cultivation. On fall plowed land, of course, the cultivator or disc or cut-away harrow is necessary.

Sowing the seed.—Beets, as a rule should be planted early. May first, or in April, even, is none too early and yet where one grows a large acreage they should not all be put in at one time in order to avoid

having the thinning all come at one time. Beets may be sown as late as June first, but I would rather risk the earlier sown ones. In this, however, as for other crops, much depends on the season. It is not policy to put in beets early in a backward season, for they are so long in coming up and so slow in growing that the weeds get a start also. If the land is plowed early and harrowed frequently and the beets sown a trifle late much will be done to destroy weeds that would bother in the after cultivation.

Distance apart of rows.—Experiments at our own station and others go to show that there is but little difference in the yield and quality of the beets whether they are sown in rows sixteen or eighteen inches apart. At twenty-four inches apart the tonnage was not so large. It is believed that twenty-one inches is about the proper distance.

Amount of seed.—I cannot see the philosophy of sowing a small amount of seed per acre. I prefer fifteen or eighteen pounds. Have them thick and then have a chance to harrow the field thoroughly and still have sufficient plants left. The saving of a few pounds of seed amounts to but little but a thorough harrowing of the land at the right time amounts to considerable.

A proper drill.—A grain drill with the beet attachments does very good work in planting beets. But a drill made expressly for the purpose does better. It distributes the seed more uniformly and covers it better, while the depth planted can be governed much more accurately. Some large growers are advocating putting in large acreage with a hand drill but I take little stock in this. I do not believe it practical.

Fertilizer.—It is my belief that fertilizer should be used on sugar beets. The beets should be forced to thinning time and nothing will do this like fertilizers The beet drill then, should have a fertilizer attachment, and fertilizer can be applied at time of sowing the beets. The fertilizer, however, can be applied with the fertilizer grain drill before the beets are sown if desired.

THE CULTIVATION AND CARE.

BY W. H. GILBERT, BAY CITY.

(Abstract.)

In his talk, Mr. Gilbert explained the methods that he had found most advantageous in the growing of sugar beets. In order that the work may be economically performed, the use of special machinery is desirable and, as it is an easy matter to destroy the weeds just before or just after they appear above the surface of the soil, the importance of early and frequent cultivation should not be overlooked.

The weeder is an excellent tool as it will not only lessen the amount of hand weeding but it can be used to prevent the formation of a crust before the beets have time to germinate. The use of the weeder will also assist in conserving moisture, by forming a thin dust mulch.

As soon as the beets are up sufficiently to mark the rows, the cultivator should be used. If the land is level and has been properly prepared, a four-row cultivator will answer but for the first two or three workings many prefer to use a two-row cultivator. Have the shovels set to run as close to the plants as possible without injuring them.

A serious mistake is often made in delaying the thinning so long that the beets are seriously injured when the work is done. The thinning may commence as soon as the beets have formed their second leaves. They should be thinned so as to leave one plant to every eight or nine inches. When thinned to nine inches the results would be fully as good and, generally, better than when they are left six inches apart and the labor will be greatly reduced. The cultivation should be kept up during the summer until the tops cover the ground. Under favorable conditions, and if the thinning was not delayed too long, there will be little trouble from weeds but for the part that cannot be removed with the cultivator, it is well to go through the fields and cut them out with hoes.

There is no crop that suffers more from lack of proper attention in thinning and cultivation, but, if this work is attended to properly there is no crop that will show the effect more than the sugar beet.

HARVESTING THE BEET CROP.

BY C. H. DERHAM, OWOSSO.

In harvesting the beets, I take eight rows and throw the tops one way and roots the other, making one large row. Bushel crates are then strung along by the side of the row, as they are brought back from being emptied by the haulers, so as to make it convenient for the topper to get them.

I put a shingle at each pile with the name of parties cutting. The hauler moves the shingle from pile to pile, giving each shingle the credit for the number of bushels in that pile, so that at night each cutter knows exactly the number of bushels he has topped. I pay one and one-half cents per bushel for pulling and topping beets after they have been loosened. I do not like knives that hack the beets all to pieces. Use twenty-five cent butcher knives; they cut the beets evenly and do not waste much. I would not advise the use of jack-knives. In drawing the beets to the car, or to the pile, I found that I can do it one-fourth cheaper by the use of crates than without them.

I always draw my beets to the lane, putting them in long piles and covering them with two inches of beet tops, and after I get through pulling and before the cold weather, I take a wagon and team and cover them about six inches thick, taking pains to have the piles run north and south so that the sun can strike the pile on one side in the morning and the other in the afternoon. In covering the beets, commence at the lower part and lap as you go up, instead of commencing at the top, and letting the rain run down among them. Make the tops lap over one another.

Every farmer in Shiawassee county should aid the sugar beet industry by putting in at least two or three acres. This will benefit a class that cannot find work anywhere else, such as women, girls and boys.

There might be enough sugar beets raised in Shiawassee county to support two factories.

THE FRUIT SECTION.

The first half of Tuesday afternoon was devoted to the discussion of topics relating to fruit culture with C. F. Hale, of Shelby, President of the State Horticultural Society, in the chair.

ORCHARD MANAGEMENT.

BY PROF. JOHN CRAIG, CORNELL UNIVERSITY, ITHACA, NEW YORK.

Before speaking on the subject which has been assigned to me, I wish to express my appreciation of the privilege accorded to me of being present at this gathering. I wish also to congratulate the farmers of the State on the excellent state of efficiency and the fine organization of your State Farmers' Institutes. You are to be congratulated on having one of the best agricultural colleges in the land,—one of the most up-to-date in its organization, and manned by an energetic and enthusiastic corps of trained workers. The names of many of your workers rank high in the list of scientific investigators in the country. Both the college and the rank and file of farmers are to be congratulated upon the close connection maintained between them. This is as it should be. The investigator of the experiment station and the teacher of the college, should work and walk hand in hand with the husbandman. Unfortunately, in some states, this intimate association is not maintained.

The fine apple products of Michigan have a reputation more than nation-wide. Whether the varieties which have more or less naturally distributed themselves from the Detroit river westward, are the varieties which are best adapted to your climate and soil, or not, is to be numbered among the problems yet to be solved by the cooperation of fruit growers and experiment station investigators. Certainly the Northern Spys and Shiawassee Beauties of Michigan create a very desirable impression wherever they have wandered.

Problem of orchard management.—The various problems of orchard management may be conveniently grouped under the following captions: The variety question, the fertility question, the pruning question, and the spraying question.

The variety question resolves itself into a more or less personal one. Shall we grow for quality, or for quantity? Shall we grow that variety from which we obtain the most personal enjoyment, or shall we cultivate a kind which in the average of years will bring in the largest returns and which obtains general recognition in the world's markets? We can recognize two types of markets. The one is gen-

eral, into which staple varieties is unloaded. The other is special and somewhat restricted, because it demands high class products, both as to quality and conditions.

In catering to these demands, the grower should recognize the principle that there are certain zones which have the conditions of soil and climate that favor the highest development of certain varieties. It is probable that nowhere in the country does Ben Davis attain such fine appearance—and such quality as it is possible for that variety to develop—as in the Ozark regions of Missouri and Arkansas. If we would seek the finest Northern Spys that can be grown, I am not sure but the best place to find them would be along the eastern shores of Lake Ontario. For Gravensteins, I would look in Nova Scotia, for Baldwins in western New York, but it is safe to say that much is yet to be learned in regard to the finer adaptations of varieties. One farm may produce a variety which is No. 1, in every respect, while a farm nearby, but somewhat differently situated in regard to soil and aspect, is much less successful in growing that same variety. So the variety question from my view-point resolves itself into selecting the kind which can be grown, and the one which the fruit grower desires to grow.

The fertility question.—Among many important items of orchard management, none is of more vital importance to the fruit grower than the maintenance of the fertility of the soil. In years past, this question did not worry the corn, grain or apple grower of Michigan or Illinois, but it is a question which will come home some time or other to the tiller of the most fertile lands upon which the sun shines. The fertility of the orchard soil may be maintained in several ways, and it is probably certain that no single method is best under all circumstances. One man may find that a top-dressing and pastured orchard is most satisfactory. Another finds that green manuring with chemical fertilizers, gives excellent results, while a third pins his faith to clean tillage, supplemented by such manures as he may be able to secure advantageously One of the gratifying things bearing upon the future outlook of orcharding, is that the number of fruit growers who regard their orchards in the light of a specific crop on the soil and therefore requiring direct feeding, is growing larger each year. The problem of feeding the plant is not essentially different from the problem of feeding the animal. Each resolves itself into one of economy in the use of foods. The essential foods should be used in their proper proportions, and thus we see at once the difficulties surrounding this work. The difficulty was not so great in former days, when barnyard manure was more easily obtainable as at the present time. In these days, the supply is limited and the question arises, what substitute can be used?

Humus needed in orchard soils.—In humus we have a substance which materially assists in the breaking-down process, which in turn results in the liberation of mineral as well as nitrogenous plant food. It is unnecessary to review the various steps which the nitrogen of organic substances undergoes while being transformed into available plant foods. It is sufficient to say that these steps are described under the term, nitrification. It is, in effect, an oxidation process, closing with the formation of a nitrate, in which form the nitrogen becomes available to the plant. This is not a chemical process but a change due to the intervention

of certain forms of bacteria. These changes can only go on when the soil is fairly porous, and when there is a certain amount of humus present. I make this prefatory statement in order to emphasize the necessity, from the fertility standpoint, of keeping up the store of humus. We are coming to believe in the East, that orchard tillage includes in the meaning of the term the cultivation of the soil in the fore part of the season, and the covering of the soil in the latter part of the season with some crop which, when it is returned to the land, will leave it in better condition, and with more fertility than it found there. This

Fig. 1. Showing Good Tillage.

is termed the cover cropping system, and it does not imply that the orchard soil is cropped in a sense that is suggested by the growing of a field of wheat, where such field is grown primarily for the yield of grain and straw. The cover crop is grown, not as a competitor, but as a cooperation with the fruit crop. It is put on the soil after the period of greatest vegetative activity of the tree has taken place. The growing season, then, of the cover crop and the tree is not coincident, although it may overlap that of the orchard crop, but it should be successive.

What, then, may we consider an ideal system of tillage? Perhaps it is most nearly approached when the fruit grower stirs the soil as early as practicable in the spring, when he maintains thorough surface tillage until the trees form their terminal buds, and when he then seeds with a cover crop. The ideal cover crop plant is one which germinates promptly, is not readily killed by a frost, lives over winter and makes early growth in the spring, when it should be turned under.

Classes of cover crops.—These are practically two: The "nitrogen col-

lectors" on the one hand, and the "nitrogen consumers," on the other. The nitrogen collectors are marked by the power of the plants of this class to appropriate free nitrogen of the air and store it up in their tissues in such a way that it is more or less readily available to the succeeding crops. It is unnecessary to say to this audience that prominent among the plants of these nitrogen collectors are, the clovers, peas, beans and vetches. Of the second class—the nitrogen consumers—we might cite rape and turnips, rye, oats, barley, buckwheat, and possibly corn, although as a rule, this crop cannot be used satisfactorily on account of its great affinity for water. I would urge, therefore, the employment of such nitrogenous crops as alfalfa, vetch, mammoth clover and cow peas, whenever it is possible to use them on orchard lands, and whenever the character of the growth of the trees suggests that more wood or vigor is desirable. Hairy vetch (Vicia villosa) has been one of the most valuable plants for this purpose that we have used. The seed is expensive. This is the main draw-back. It germinates readily, however, and succeeds as well during dry seasons as wet ones. As a nitrogen collector it stands high, giving so far as analysis shows, more nitrogen to the acre than any other cover crop we have tried.

It frequently occurs, however, that soil may be in such a condition that a catch of mammoth clover, which I would like to recommend very warmly, is difficult to secure. In this case, I would recommend the use of rye or rape for a year or two, until the plowing under of these crops have so ameliorated the soil that a catch of clover is possible.

We have tried with very good satisfaction, a number of cover crop mixtures. Prominent among these is a mixture of mammoth clover and alfalfa—eight pounds of each—with two or three ounces of cowhorn turnip per acre. I have observed that Professors Taft and Hedrick of the Agricultural College, recommend for Michigan, a mixture of crimson clover and oats, to be sown about the middle of August.

Vetch and rye have been used satisfactorily in the proportion of one bushel of the former to one-half bushel of the latter. By all means use cover crops in the orchard. They will keep down your expense bill for commercial fertilizers. They will tend to keep up the vigor of your trees, and they will greatly improve the physical condition of your soil.

The spraying question.—I need not emphasize unduly the importance of this question at this meeting, because I realize that the efforts of your energetic Director of Institutes, Professor Taft, who has been a strong advocate of spraying for many years and who has been one of the leading investigators in the work, have brought forth abundant fruit in this State. I might draw attention, however, to some facts which were impressed upon us in connection with spraying by the peculiarities of last season. In New York it was exceptionally wet. We found in some cases that Bordeaux mixture, made according to the ordinary formula, four pounds each of copper sulphate and lime to forty gallons of water, caused injury to apple foliage. We found also that the injury was decreased in proportion to the increase of lime above the amount called for by the litmus paper or prussiate of potash test. Some growers used two or three times as much lime as was called for by the test, and as a consequence had little or no injury. This observation was tested carefully, and duly corroborated. I am, therefore, of the opinion that it is wise in the long run to use as much lime as can be conveniently

discharged through the nozzle. The efficacy of the spray as a fungicide is not materially lessened thereby.

Spraying is an insurance. The man who succeeds, is the man who sprays every year. He insures his crop against the possibility of destruction by insect and disease. He strengthens his trees, so that they are more resistant of disease. In the average of years his work pays. Buy a good pump, make Bordeaux mixture properly, apply it in time, apply it thoroughly, and you are profitably insured.

The pruning question.—This problem does not touch you as closely

Fig. 2. Picking and Grading Apples in the Orchard.

and perhaps is not as important in this State as it is in the older fruit-growing regions. As trees grow older, the necessity for pruning is driven home more clearly. We usually realize, in the case of the maturing orchard, that our pruning efforts should have been commenced many years ago. Ordinarily the trees are neglected for a number of years, and then pruned all too vigorously, with disastrous results. The branches of the tree top become accustomed to partial shade, just as an entire tree becomes accustomed in the forest to shady conditions. If the tree top is suddenly opened up by a too severe pruning, it suffers from sun scald just in the same way that the protected forest tree suffers when its companions are cut down. Pruning should begin with the setting of the tree, and be continued annually. In this way no very heavy pruning is necessary in one season. The heavier pruning should be done during the dormant period. Trees may be revitalized considerably by heavy pruning back. As they grow old, vital energy leaves the branches and they die. If these dead, or dying, branches are left on the tree, they absorb in some degree the vigor of the organism. They should

be removed, and in order to stimulate new growth, the tree may be headed back, which often results in a new lease of life, and a new period of productivity. Much bad pruning is done. The pruning which leaves long stubs, and the pruning which lacerates the tree as the branch breaks off, results in direct injury. All branches should be cut close to the stem, and all cut surfaces should be painted. It is often desirable to cultivate a water sprout instead of cutting it out, as is the usual practice. The water sprout is an expression of nature's endeavor to renew a branch. The old branch from which it sprung, cannot be reinvigorated and should be removed and replaced by the young and vigorous sprout. This is not always practicable, but should be attempted wherever possible.

In short, then, orchard management, while it rests primarily on the maintaining of the fertility of the soil and the destroying of the enemies which attack the trees and the shaping of the tree, so that a maximum of vigor and health may be secured, has also to do with the selection of suitable varieties for particular regions. These are the questions which the orchardist of the present day and of the future, must study closely, and these are the questions which such institutes as this can by the interchange of individual experiences, do much toward solving.

Q. Would you cut closer than the collar, the natural swelling at the base of the branch?

A. Prof. Craig.—The closer you cut the quicker it will heal. You should protect the wound, however, and painting it is the best method.

Q. Why does summer pruning increase wood production?

A. Prof. Craig.—This cannot be answered very satisfactorily. It is a fact, however, that severe pruning during the summer tends to promote the production of fruit buds.

Q. Does the production of fruit buds start about the first of August?

A. Prof. Craig.—It generally begins before the development of leaf buds is completed. Fruit trees seldom make much growth after the first of July.

Q. Why do you use arsenites for spraying before the buds start?

A. Prof. Craig.—In New York we are troubled by bud moths.

Q. After trees have been grafted would you prune out all the branches at once?

A. Prof. Craig.—No. Do it gradually and thus prevent sun-scalding.

THE FRUIT GROWER AND THE CANNING FACTORY.

BY HON. R. D. GRAHAM, OF GRAND RAPIDS.

(Abstract.)

Mr. Graham referred to the recent rapid development in the business of canning fruit and vegetables on a commercial scale in Michigan. A large number of factories have been erected during the past three or four years and have materially aided the fruit grower, by purchasing his fruit at times when there has been a large supply, thus preventing the glutting of the markets and the resulting drop in prices. When the erecting of canning factories was first talked about, one of the strong arguments in their favor was that they would consume the second-class fruit. While this is true in many cases, the majority of the factories use only the best fruit they can secure.

From the fact that many of the factories had been erected by stock companies, composed of fruit growers, who have had no previous experience in the canning business, it has not been strange that a considerable number of them have not met with financial success. In some cases, sales have been made to irresponsible parties and losses have resulted and, in other instances, failure has been due to the fact that the goods have not been properly prepared, but a far greater and more common cause of trouble has been that many of the factories have been erected in sections that have not been in the fruit and vegetable growing business, with the idea that if the factory was erected it would be an easy matter to secure a supply. In some cases, they have been successful but, in others, the farmers have not desired to change their crops and have refused to make contracts. The principal difficulty, however, has been met in securing the various kinds of fruit for the factory as, not only does the objection just mentioned hold true with fruit, but it takes from three to four years with bush fruits and six to ten for the tree fruits before crops can be secured after the planting has been done.

In a general way Mr. Graham regarded the erection of canning factories as an advantage, in sections where fruit and vegetables are now extensively grown but he did not favor the idea of first erecting the factories and then trying to induce the farmers to plant fruit trees and vines for the purpose of supplying the factory. He was especially emphatic in opposing the idea of the erection of canning factories by fruit growers, believing that it should be left to specialists, as they would be far more likely to succeed.

Q. What variety of pears are used?

A. Mr. Graham.—The Bartlett almost exclusively.

Q. What is the usual price of peas?

A. Mr. Graham.—I cannot answer. They are bought by the ton and threshed the same as oats.

Q. How do you handle sweet corn?

A. Mr. Graham.—It is brought in in wagon loads in the husk for the protection of the kernels.

Q. What do they pay per ton for sweet corn?

A. Mr. Hale.—Six dollars.

ETHICS OF THE FARM.

BY HON. C. J. MONROE, SOUTH HAVEN.

Among several definitions of ethics, I have chosen the general one—"The Science of Human Duty," duty to one's self, to others and to his Creator. It involves right, character, conduct, virtue and obligation. In this short talk I wish particularly to bring out that phase which relates to common honesty, honesty with one's self and in one's dealings with and relations to others. The need of this should be emphasized in every department of human endeavor. It is one of the foundation principles in self-government, essential to its existence and continuance, and should be one of the first and most substantial incentives in the fitting of men and women for the home, the neighborhood, the citizen and for the varied social and business affairs.

There are few if any callings or classes of business which naturally and in so many ways enforce the necessity of honesty as farming. In the ordinary crops, from the selection of the seed to the marketing of the product, integrity must accompany every step. No juggling or deception or neglect will be tolerated by nature, the ever exacting master. If the seed be poor, the ground illy prepared, the subsequent care or cultivation slighted, the harvesting delayed, or the marketing carelessly done, this master will pay accordingly and no plea of ignorance, or the shifting of the responsibility upon someone else will be permitted. Watered stocks will be accepted to the extent that they have contributed to the growth and maturity of the plants, likewise combinations which join intelligent methods in the varied and complex operation of the farm, and trusts resting on a foundation of genuine hard-heads, liberally cemented with the mortar of integrity.

Probably in no department of farming do we find more urgent need of honesty than in fruit growing, particularly in the production of the trees, plants and vines, that they shall be true to name and their quality fairly known and correctly given. The losses, whether from carelessness or from deceit in the sale and delivery of plants, vines and trees, have amounted to many millions of dollars, and what is still worse, in an enormous loss of time. Few experts can tell what the fruit will be until the time of bearing. Take, for example, some of the choice apples, and standard pears, which may not bear fruit for ten or fifteen years, at the expiration of which time you may find that you have been deceived. Thus, not only is the use of the land and the years of care and expense mainly lost, but the time cannot be recalled, for it is gone forever. In many cases where men have set trees late in life, the keen disappointment of finding their orchards not true to name and poor or worthless in

quality has deterred them from further setting. With some years of experience and a chance for extensive observation in the past fifty years, I have come to feel more and more that the man who raises or sells fruit trees and does not realize the vital necessity for truth and honesty in their names and quality is an enemy to the orchardist and should be suppressed. I never have occasion to think along this line without recalling the late Hon. T. T. Lyon, who was not only an expert critic on names and quality of the fruits, but a man of conscience and honesty who could not be induced to recommend either name or quality without the most painstaking experiments and carefully kept records.

The need of lessons in honesty is enforced in the breeding of all sorts of farm animals; in cattle whether for the dairy or feeding, or sheep for wool or mutton. In the purchase of these for special purposes the average buyer must depend largely upon the raiser whether all the rules of experience and intelligence have been complied with and honest records kept. Here again the element of time is of great consequence to the man who is purchasing animals to start a herd for any of the above purposes. In the department of seed growing the need of honesty is made quite as apparent.

Thus we might go through all the departments and find that each one has many illustrations of the need and the advantages of integrity. Honesty is not only the best policy, but it should be the foundation of every policy, individual, social or religious. The indifference or neglect, or, what is worse, the misuse of these plain simple lessons is frequently exemplified. How many illustrations in marketing all sorts of foul or foreign things in the grain or wool sold, weather-beaten or rotten hay hid in the center of the bale, tags of dirty wool in the fleece, small, scabby, wormy fruit in the center of the box, basket or barrel, with attractive surroundings seeking an unfair price, and in some cases obtaining it, but in the main bringing damage and loss to the party in particular and to the producers generally, besides greatly lessening the demand because of the uncertainty from these deceitful practices. Much improvement can be made along all these lines by an insistence, so far as possible, that a man must put a responsible name behind everything offered for sale. One who is not willing to do this advertises to would-be-buyers that they must beware. Little below the market price too often induces the buyer to take on sight but really unseen.

Another phase not to be overlooked in these practices is the baleful influence upon others. What sort of service can a man expect from hired help who witness these deceits or are sometimes actually instructed to put in and sell all the product, or to add water to make the milk go round, or stuff and pad the fruit package. Still more serious is the example to the children. James G. Blaine once said: "The farmers of the republic will control its destiny. Against the storms of popular fury, against frenzied madness that seeks collision with established order, against the spirit of anarchy, that would sweep away the land marks and safeguards of Christian society and republican government, the farmers of the United States will stand as a shield and bulwark, themselves the willing subjects of the law." This sentiment has been recognized from creation; and in one form of words, or another, has been frequently reiterated by statesmen in various periods of the world's history. In recent

years the Masters of State and National Granges, and leaders in other farm organizations, have repeated this sentiment in forceful, pertinent language, seeking to make it more true in practice.

It seems to me that the coal operators are a large illustration of the need of more ethical training. I fell more certain of it since forty or fifty of them were indicted by a grand jury. They have a physical development to stand a laborious, strenuous life, have a mental equipment which enables them to combine large railroad and mining interests so as to employ a vast army of men, women and children, but they have shown to a painful degree a lack of appreciation of their moral duty. No equal number of men could have foreseen more clearly, or certainly, the suffering to individuals, the interruption of all kinds of business, the closing or curtailing of manufacturing, the idleness of employes when work is most needed to meet the extra cost of living, and the consumers variously damaged by delays in getting contracted materials, which in turn delayed deliveries to others, all sure to follow the months of the strike. By so much as the operators were better educated, had more knowledge of the direful results sure to follow the prolonged cessation of mining, and possessed larger means, by so much will they have the greater responsibility for an interruption which has caused untold suffering and the loss of millions of dollars. While the very foundation principles of our government grant the largest possible liberty to the individual in the management of his property, he must remember that there is a paramount duty that it shall not be used to injure others either in person or property.

The extending of our national control over new and distant territories brings new responsibilities and obligations, greatly increasing the necessity of moral stamina of a firmer fiber. The proper ruling of these far-off countries will impose upon this country a severer test than has heretofore been put upon it. If we make good the claims so loudly and persistently advanced that we have the best government on earth, that it is our mission to give to every land the benefit of our laws and customs, our freedom and intelligence, in a word that we possess in larger degree than any other nation in the world the things most certain to realize that cherished goal—happiness—we must bring our ethical practices more nearly up to our ideals. While not lessening our elaborate efforts and expenditures on physical and mental culture in our universities and colleges, and many other public and private gymnasiums and schools, we have abundant evidence that we must elevate to a higher plane the ethics of our moral life. It seems to me, judged by the past, that the farmer must continue, in a larger degree, to be a leader in giving moral or ethical training, also to stimulate patriotism and love of country, ever remembering that the government will and must be typical of the majority of its citizens.

The latter part of the afternoon was devoted to the discussion of topics relating to the improvements of our highways. Hon. E. P. Allen, of Ypsilanti, a member of the Michigan Highway Commission, occupied the chair and introduced the subject by referring to the importance of securing better highways in Michigan and favoring such legislation as will permit the securing of better results from the money expended upon them. The following papers were presented:

THE CONNECTICUT ROAD SYSTEM.

BY JAMES H. MACDONALD, STATE HIGHWAY COMMISSIONER, HARTFORD, CONN.

The farmers of the United States have at last awakened from a Rip Van Winkle sleep of not only twenty years, but centuries, and fully appreciate the fact that no matter how fertile their fields, how comfortable their homes may be, how large and well-built their barns, or how well-fenced are their possessions, nor how great a yield of crops has resulted from their labors, except they have pleasant, safe, and easy access to market, for that which they raise, for three hundred and sixty-five days in the year, they are poor indeed. We had a slight awakening, a rubbing of the drowsiness from the eyes, of the people of Connecticut, in 1895, that resulted in the passage of a good roads law, which contained not only the establishment of a recognized head over the highways of the state, but, in addition, after enumerating his duties and privileges, made an appropriation of $75,000 a year; inasmuch as our sessions of the legislature only occur every two years this appropriation was $150,000. The law provided that every town in the state should have access to this appropriation, no discrimination being made; but the amount paid in any one year by the state was limited to $3,000. The law, however, laid an obligation upon the town to provide an equal amount and the county was required to contribute the same amount as was expended by the state and the town. The state was to contribute one-third of the expense of the construction in any one town up to the amount allowed by law, or apportioned by the commissioner. A mathematical calculation arranged on the basis of 168 towns, that being the number of towns we have in our state, provided they all came in to accept state aid, multiplied by $3,000, the maximum amount, would at once show from the result that if the entire state came in it would be impossible to give them all $3,000 as the entire appropriation in any one year, state, town and county, would only be $225,000. But the law was so arranged that if the number of towns exceeded the appropriation, the pro rata share for each town, would be determined by the number of towns applying. It was found, however, that towns being unacquainted with the attitude of the state refrained from accepting state aid sufficient to make the appropriation fully adequate to satisfy all applications. No town was restricted in the amount it might apply for if it did not exceed the maximum limit.

Towns were allowed to apply for any amount from a dollar up to $3,000. The result was that eighty-seven towns took advantage of state aid. These towns were principally towns whose financial condition allowed them to take advantage of the law, while the poorer towns of the state by a large majority remained outside. We found that it was not altogether the question of the financial assistance furnished the towns of the state which brought about an objection, but it was in other provisions in the law; the chief objections came from a town in a county

which did not apply for state aid objecting to furnishing funds to construct roads in other parts of the county in which towns did apply. In other words, to pay a county tax when they did not apply.

In 1899 the law had attained such a degree of perfection that it was indorsed practically unanimously by the entire state of Connecticut. On the assembling of the legislature in 1901 the appropriation was increased by a unanimous vote of the House and Senate to $450,000. The number of towns that applied exceeded the appropriation $230,000, and again the scaling down process had to be resorted to, which resulted in 85 towns having their application reduced from $9,000 to $5,200, which made a sum total to be used during the last two years of $613,000. The entire money which has been expended during the past eight years appropriations is $900,000. The present law provides that the state shall pay two-thirds of the cost in towns where the valuation is one million dollars or more, and three-fourths of the cost where the valuation is less than one million dollars.

The scope of the improvements is very wide, and a large range is given all the towns in the state in the character of the work and also in the material to be used and the improvement that is to be made, from a first-class macadam road built under improved and scientifically tested methods to the simple proposition of removing boulders from out of the traveled path, the gutters, and the margins, and rounding up this last named requirement by simply turnpiking the section from which these boulders have been removed. Indeed, we find that the majority of our towns in Connecticut are very well content to cut down excessive grades to a minimum, lift up all the low or wet places, put in a system of gravel construction and a good system of drainage, remove unnecessary distance by straightening the road wherever it is neccessary, by the removal of unnecessary curves.

The inspectors appointed by the commissioner are as a rule selected from the board of selectmen, the choice generally being the first selectman. The reason for the selection of the first selectman is the education gained while acting as inspector over the work is retained in the town; the second reason is, he has an added interest in having the work done well, and the townspeople prefer to have one of their own town over the work rather than an outsider. The third reason is it is a great saving of money, as the state does not have to pay railroad expenses, carriage hire, or hotel bills.

What has been done in Connecticut, it is safe to say can be done in the State of Michigan. I do not say that this law in its entirety would be applicable to the State of Michigan. I do say, however, that the main features of the law, a highway commissioner should be appointed who would be competent to take up this great question of road reformation in your State, and carefully investigate for himself what is necessary to be done to establish, under some intelligent plan, a betterment of your system of highways throughout the State.

I do not think it wise, from my own personal knowledge, of what is required in the establishment of a system anticipating the improvement of your highways, to appropriate one dollar for road construction in advance of an appropriation for the future until a thorough and complete investigation has been made of the conditions of the highways of the State, the material available, and the proper methods to pursue. For every dollar you expend in attaining information along the lines I

have suggested it will return a thousand fold in the economical and scientific development of your highways in the future.

Q. How would you drain a road bed where there is a sandy quicksand?

A. Mr. MacDonald.—If you have a good gravel bed within two miles the road bed should be graveled after it has been turnpiked.

Q. What is the expense per mile for grading and graveling in Connecticut?

A. Mr. MacDonald.—Generally from $500 to $1,000 per mile. This will provide three courses. First, put on three-inch course, roll, then another three-inch course and roll and finally a two-inch course and roll until hoof marks will not show. A road made in this way will often equal macadam. Michigan has the best gravel in the country.

Q. What is the expense per mile when made of crushed stone entirely?

A. Mr. MacDonald.—For a fourteen foot road, generally less than $3,000.

L. B. Rice.—Marl and sand equal parts, make a good road when gravel cannot be secured.

Mr. ————. I wish to thank the commissioner for his remarks commending the old system.

Q. Would you retain the present system or impose a money tax?

A. Senator Earle.—I would bring in a cash system gradually.

A COMPARISON OF HIGHWAY SYSTEMS.

BY HON. HORATIO S. EARLE, CHAIRMAN STATE HIGHWAY COMMISSION, DETROIT.

There is no question in my mind but what every man, woman and child at this Round-up Institute are in favor of good roads where the traffic is sufficient to pay for the building of good roads, and better roads most everywhere else.

The matter of systems then is a very proper thing for us as citizens of Michigan to look into, to the end that we may get better roads and get them as cheap as possible. We should look over our own system and then look over that which other states are using or working under that have better roads than we have, and see what we can drop to advantage and what we can put into its place to our own good.

We have now a conglomerate system, a State system to the extent that we can give swamp land to aid in building State roads, provided that we had any swamp land that would induce anyone to build a road and provided the State would give some locality aid at the cost of all other localities; a county system where it has been submitted to the people by the supervisors and voted for, and a township system where the supervisors have refused to submit it to the people, or where they have and the people have voted it down, and afterwards in either case the people in such townships have used this round-about-extended privilege

to them and voted to adopt it as a township system; and that last but not least-talked-about-system called the statute labor system, which won't work without help and the better the help the better it works.

I lately was privileged to speak to a small audience in a big hall in Chicago and after a multi-millionaire had spoken who made light of the work done by the farmers of the country in building and improving the public highways, I said "the farmers of Michigan have built a road one hundred thousand miles long and worth one hundred million dollars," then I turned to the vice presidents of that meeting who all lived in cities and asked them "if they had done as much," and got no answer.

Then I told them that I was reminded of a Mr. Brown who had three sons, the first he named John Farmer Brown, the second James City Brown and the third Thomas Corporation Brown. In their home there was but one table and at that table John, James and Tom sat and ate their fill, but after dinner they all went out to work to provide further food for all to eat and enjoy. And the road is like Farmer Brown's table. It is not for John Farmer Lumber Wagon Brown all alone, nor for James City Pleasure Carriage Brown to monopolize, neither is it expressly for Thomas Corporation Automobile Brown, but for John, for James and for Tom and, if ever the roads of this country are made as good as they are in the Old Countries, John, James and Tom will have to contribute something to the fund that makes them so. At the present time, and for all time in the past in Michigan, the farm property alone has paid the whole bill of building and improving the highways, that is five-thirteenths of the State's assessed valuation, and the five-thirteenths in villages and cities and the three-thirteenths in corporations has gone Scott free and used the roads whenever they liked.

If George Washington stood in this room I would as quick assault him as I would attack the statute labor system of this State, which has produced one hundred thousand miles of road and worth one hundred million dollars. However, it is my opinion if George Washington should come back to-day that he would need some up-to-date education in order to be able to keep up with the times and be as efficient as a man with his will and purpose was wont to be, and so the statute labor system needs some up-to-date education and some up-to-date additions to it, and after a while our additions to it may change into quite another system and not cause a ripple. I noticed that, when the Grand Trunk road built their new bridge at Niagara, they did not tear down the old bridge and then build a new one, but instead they built their new bridge into their old bridge and you could not tell when the old bridge ceased to be and the new bridge came into existence and so should the present road system be changed so slowly and carefully that no shock will be given and nobody be disturbed, for should we blot out the present system and undertake to replace it with another, no matter how good the new one was, it would fail before it got started and the ultimate end would be that we should go back to the old and it would be a long time before we would make any more attempts.

To throw away this system before we have another would remind me of a man who because there was a bolt gone in his mowing machine that perhaps would cost him fifty cents to provide, he would throw the machine into the fence corner and stop having until he could send to the factory and get a new one that would cost him forty-five dollars.

The statute labor system needs a bolt and not the kind of a bolt that colts sometimes take when you are breaking them, but one that will bolt on an up-to-date attachment that will make it work much better than it has worked until we can, if we want to, supplant it with a new machine.

And I hardly think it fair to find too much fault with the path-masters either. If you should send twenty children to a schoolhouse in which there was no teacher and no text books of any kind or description, and tell those children to educate themselves, you would not expect they would get a very fine education would you? You certainly would not have a right to expect much, yet you have sent the path-master to the road that is worth a hundred million dollars and you have told him to educate himself and those under him how to build and improve roads, and all without a teacher or a text-book. With all this to contend with, you add a worse by turning him out and putting another man in by the time he gets so he is any good.

Well, I have a prescription to offer and I believe it will materially aid. First, I would create in this State a highway bureau, and I would put in a road builder as State Highway Commissioner; I would allow him to hire a first-class civil engineer and such other help as the demands upon such department made necessary, and this department should be subject to the call of any township in the State for expert advice on how to build and repair roads, or bridges, where a sufficient amount of money was to be expended to warrant the expense. I would give that department the power to create in every county what should be known as the county board of road commissioners, made up of every township highway commissioner in that county. It should be the duty of that State Highway Commissioner to hold at least one day of road school in each and every county in the State every year, and every commissioner that attended should draw the same pay as though working on the road, together with his legitimate traveling expenses from his township, and in my opinion this would be money well spent by his township. Further, I would make it obligatory upon every overseer of highways, every township and county highway commissioner, and every superintendent of streets in the State, to make an annual report to such State department and under oath answer such questions as the State Highway Commissioner might think proper to ask. This would be beneficial in two ways, first, it would make the overseers and others do their duty, for if they did not, the State commissioner would get right after them with the sharp stick of the law, which they would tell their neighbors, and you can readily see that a man would either pay his tax, or work it out rather than have his neighbor overseer pay a fine for not doing his duty, and it would be a great benefit in another way, which would be that the State commissioner would get in each year about 1,500 reports and the last question asked by the State commissioner of each would be, "What have you discovered in road or street building or repairing this year that ought to be communicated to every other builder and repairer in the State for the good of the State?"

Do you doubt this being worth one-half cent to each citizen in Michigan each year?

Another thing would materially help us, and that is State aid, but we cannot get any until we change our constitution. While we are getting

that changed we can look about and find what system it would be best for us to adopt when we do get it.

In Massachusetts, the state builds state roads, and after building them keeps them in repair. They are built from city to city and practically are great and grand boulevards, fine residence streets, and, as Massachusetts is rich and can afford such luxuries and is satisfied to pay for them, it is all right that she should have them; but that plan will never do for our State.

In New York, the state will give as much money for permanent road building as will the county and township, and last year the state's share was $800,000 and the smaller political divisions the same, making a total of $1,600,000 expended on permanent roads in that state in one year, but, like Massachusetts, they build very costly roads and like Massachusetts they can afford them, for the taxes largely come from the franchise and kindred taxes, but their plan will not answer for Michigan.

In Vermont, they make an appropriation for permanent roads from the general funds of the state. They divide that appropriation by the number of miles of road in the state, which gives the allotment per mile, and they give this to any town in the state that builds a piece of permanent gravel, or other metaled road, according to the required specifications of the state highway commissioner, that costs as much as the allotment. This I like in part, but I think that the state should only help those that are willing to do something themselves.

In Connecticut, we find in my estimation the ideal plan, for there the state gives a certain amount of aid to any township in the state that will raise a certain sum and will build a piece of permanent gravel or stone road. This has been adopted by every town in the state with the exception of three.

Michigan should adopt the Connecticut system, that is as in Vermont, make an allotment on the basis of mileage that there is in the township, and as they do in Connecticut only where the township raises its part and builds a permanent road, according to the required standard of the state commissioner.

Where would this piece of road be built? Where the township board said build it, and under the supervision of the township highway commissioner who would have the specifications of the State Highway Commissioner to guide him, and when the road was built it would be inspected by the State Highway Commissioner and if found up to the standard the township would receive from the State the State aid.

This would give a good roads school in every township in the State, and your township highway commissioners would become scientific road builders and you would keep them in year after year, and the overseers of highways who would have the guiding of the statute labor would take pattern after the work done under the supervision of the State Highway Commissioner and you would find that their work would improve.

But, you would find, after you had this system well organized, that townships would of their own free will and accord vote to pay their road taxes in cash and put all of this money into the hands of the township highway commissioner, who would use only what was absolutely necessary for the repairing of the poor dirt roads, and as much every year as he possibly could for building gravel and stone roads, and in ten years

from the time that we get this new bridge built into the old one you will find that the roads will be fifty per cent better than they are to-day.

The present Michigan highway commission, of which I have the honor to be president, was created by the legislature of 1901 and appointed by Governor Bliss. It was given the right to pay any salaries that pleased them, and be to as much expense as they liked, but with the greater honor of paying all of these themselves, or in other words to do two years' work free gratis. We have done it, and I have had my good roads train in the field four weeks in 1901 and nineteen weeks in 1902.

I am not a millionare and could not have done this, if it had not been for the help that I have received. The Pere Marquette took my train anywhere I wished to go, free, showing that they too are awake to the needs of improved roads and the benefits to be derived in their possession. The machinery manufacturers furnished me the machinery free. This gave rise to the report that I was selling road machinery, which is false, and the papers that gave out the report knew it was when they made it.

I have issued a report and good roads' text-book of over 100 pages and have guaranteed to the State printer that, if the State will not pay for the printing, I will. I shall be glad to send one of these reports to anyone that will write to me for one. They can also be obtained from either your representative or senator in the legislature.

The commission cannot continue its gratis work any longer, either the State will create a highway department and pay the legitimate expenses of running it, or all systematic work must stop.

The roads are for John, for James, and for Tom, and the only way that James and Tom can be made to help John in the expense of building them is through State aid, to the end that all property shall be taxed to build roads over which the owners of all property have equal privileges, and State aid can never be handled without a State highway department, so, if you are in favor of one, you are of both and if against one against both.

BUILDING AND MAINTAINING HIGHWAYS.

BY FRANK F. ROGERS, PORT HURON.

Any practical discussion of this subject in Michigan must ever have in view two important considerations. First, the present road laws of Michigan and the officers available for road building and maintenance under their provisions. Second, the fact that the greater part of all the roads that will ever be built in Michigan have not only been laid out and established, but have had many dollars spent upon them, both for construction and maintenance. The problem is, therefore, very different from what it would be were ideal laws to be created and new roads to be located and built in a country where nothing of the kind had been attempted.

For these reasons it is necessary to advocate no schemes, at this time, which cannot be carried out by existing road officers, nor which

existing laws cannot readily provide the funds for executing. Again, no plans for improving our roads that do not provide for utilizing to the fullest extent the work already done should ever be tolerated. Accordingly, in the following discussion I shall keep in view the fact that, for many years to come, the majority of our roads must be of common earth and that no money can possibly be wasted in constructing the best kind of earth roads excepting that they will some day be utilized as the foundations for better roads and covered with gravel or stone. In short, it is safe to say that no better earth roads can be made than well graded, properly and thoroughly drained road beds made ready to receive the metal which would convert them into first-class gravel or macadam roads.

Notwithstanding what has been said regarding present laws and existing roads, it is quite apparent, even to the casual observer, that lack of well defined plans results in doing much needless work and doing over time after time work which would have been finished at the first attempt and never again disturbed, had the first officer been working in accordance with plans and specifications which clearly outlined to him just what must have been done to make the job complete, satisfactory and permanent.

While many counties in Michigan are now working under the county road law and producing excellent results, the road district here referred to, so that it may be more general in its application and more easily undertaken, will simply comprise an ordinary township.

Plans should consist of maps showing the location and width of all roads in the township, the nature of the material composing them, the location, kind, and size of all drains, covered or open, as well as culverts and bridges and should include a system of profiles of each road, showing where and just how much cutting and filling will be required to reduce the steepest grades to about six feet in one hundred. There is little excuse in Michigan for grades exceeding that limit and where such grades cannot be secured on old road lines at reasonable cost, new locations should be made.

It may be urged that such plans will be expensive. This is easily answered by saying that the cost would not be so great as might be supposed. It would, at least, be within the reach of an ordinary township. Even if such plans were to cost $1,000, it would be found cheaper to buy them and follow them than it is to do work in an unskilful and unsatisfactory manner and continue to repeat failures and make over again old experiments, year after year at great expenditure of money and labor in attempting to do road work for which, a few months after it is done, there is little or nothing to show.

That many road districts in Michigan do excellent work cannot be denied. In fact, there are districts that could not do much better with the various kinds of earth and gravel roads, under the most approved system that could be devised. Such districts, however, are the exception and not the rule and their location is so checkerboarded over the State, that but little real good is derived from them. No road fulfils its mission unless it is all good. A good mile here and a bad mile there is of but small value, for every farmer in starting for market necessarily loads for the bad mile.

While it is impossible, under any system, to make all roads good at once, with suitable plans to work from on which each road was not

only designated as to the kind of improvement expected, but as to its order in that plan of improvement, a system can be devised, adopted by the various township boards and adhered to, which, in a few years, would result not only in the substantial improvement of all the main roads, but would set in motion a system for the economical construction and maintenance of all other roads which must wait many years for a hardened surface.

With this brief preliminary statement I desire to offer some suggestions, somewhat in the form of detailed specifications, for the building and maintenance of the various forms of earth, gravel and macadam roads.

EARTH ROADS.

Location.—In that portion of the United States where the land has been surveyed in rectangular townships and sections, it seems to be an unwritten law, as unchangeable as that of the Medes and Persians, that section lines were laid out for the express purpose of building roads upon. For the most part it is necessary that section lines be made road lines, in order to reach the homes of the people, but this should not be allowed to become a hard and fast rule and we should not hesitate to deviate from them when physical conditions make it practically impossible to build roads on such locations. High hills too expensive to grade down, swamps too extensive to drain or fill up, and streams too difficult to bridge, are all proper reasons for deviating from section line roads, even at considerable cost for new right-of-way. It is usually economical to go around the bad hill or swamp, following the easiest grade possible, even though a whole field has to be bought for that purpose. These undesirable and untillable hills and swamps and spare corners which the township would then own could be planted to trees and shrubbery and thus be made into natural parks along the roadsides. They would thus become valuable object lessons in tree culture and road decoration, as well as in the economy, not only of the first cost of road building and maintenance, but a much greater economy to the users of the roads for all times.

Grades.—Hills and hollows which it is not desirable to go around should be cut down and filled up till the grades are not steeper than six per cent for rolling and hilly country, and be kept down as low as two or three per cent on comparatively level land.

It should be remembered that the force required to move a given load on the level varies from one-twentieth of the weight of the load, on a common earth road in good condition, to about one-thirtieth of the load on a good gravel or on a fair macadam road and continues to diminish to as little as one-fiftieth of the gross load on the best macadam surfaces. But, when a hill has to be climbed, an additional force is required equal to that fractional part of the load obtained by dividing the height of the hill by its length. It is not probable that grades will receive the attention they demand until the truth of this statement is more fully realized and we will therefore illustrate it a little more at length.

To simplify the expression we speak of grades in terms of their rise in each one hundred feet of length. Thus a hill rising five feet in each hundred is spoken of as having a five per cent grade, while the extra

force required to climb it will be five one-hundredths or one-twentieth of the gross load added to the force required to haul the same load along a level road having the same kind of surface as the road on the hill. In other words, it would require just double the power to pull the load up the hill as it did on the level. If the hill were to rise ten feet to the hundred the extra force required in climbing it would be equal to one-tenth of the gross load and so on.

Inasmuch as a horse can exert fully double his ordinary working strength for a short time, it is apparent that no road should have grades that will require much more than double the force to climb than would be required to draw the same load along level roads having the same kind of surface. Thus a good earth road will not be appreciably improved by reducing the grades to less than five per cent unless they cover a considerable portion of the length of the road, while the best macadam and gravel roads will not be ideally perfect unless the grades are reduced to at least three per cent and, in extreme cases, to as low as two per cent.

Width and Shape.—Some country roads are too wide and some are too narrow. From eighteen to twenty-four feet between the side ditches are economical and practical widths for country roads. Each township should classify its roads and adopt that particular width for each road between these limits that is best suited to accommodate the travel it must sustain. When the width of a given road is decided upon it should be placed upon the plans and not varied from in the future.

The shape of a road must depend upon several things, but primarily on the kind of soil it is built upon for that will necessarily fix the size, shape and location of the drains. The road bed proper should have a crown of from one-half inch to three-fourths of an inch for each foot of width. This detail will also be shown upon the plan.

CLAY ROADS.

Clay and all classes of wet roads need thorough draining. Where there is much surface water large open ditches must be provided. It is important that these ditches have sufficient capacity to handle all ordinary storms without flooding the road. They should have continuous grades and free outlets in the natural water courses intersecting the roads. It may be necessary to improve these water courses for some distance outside the road allowance to prevent back water. When necessary this requirement should not be neglected.

Such ditches should be located along the side of the road from which the most water comes so as to prevent as much water as possible from soaking into the road bed. Large open ditches may be placed between the regular gutters and the fence line, with occasional openings through the shoulders between the gutters and the main ditches. When large deep ditches are located alongside the road bed they should be protected by suitable guard rails.

Tile Drains.—All springy places and most clay roads will be improved by underdrains. To be of the most value their trenches should be filled with cinders, coarse gravel or broken stone up to the road surface, otherwise the road becomes puddled on the surface and prevents a great deal of water from entering the drains. Two lines of tiles from

two to three feet deep, parallel to the center line of the road and from eight to ten feet distant on either side will be found of great value to all clay roads.

On springy hills the drain should run diagonally from the center to either gutter where suitable outlets must be provided. The frequency of such drains will depend upon the amount of water to be handled.

Underdrains in each gutter, or along the margins of the grade, as above mentioned, are of great value where large open ditches are not required to handle the surface water, inasmuch as they lower the water plain some two or three feet more than would be possible without them. A drain down the center of the road having the trench filled with some coarse material often serves the same purpose.

Repairs.—Clay roads should be kept well crowned so as to have from one-half to three-fourths of an inch rise to each foot in width. Any more than this is a positive injury and should not be tolerated. They should be smoothed down each spring after the ground has settled and as often thereafter during the season as they become rutted. After being leveled with a scraper, a good rolling will prevent their becoming rutted so easily again and will leave them in excellent shape to make fine summer roads. In fact there are no better temporary roads than well-shaped clay roads when dry, smooth and hard.

SAND ROADS.

Sand roads need quite different treatment. They should be but slightly crowned and have very shallow gutters. They can also be made rather narrow. It is better to allow the sides to grass over whenever possible. Their worst enemy is dry weather and they should be built and repaired with a view to retaining as much moisture as possible. Trees should be planted along the road side and the natural ones and much of the brush allowed to grow; in short, it is best to do everything possible to keep them very much in the condition of forest roads.

SAND-CLAY ROADS.

A coating of sand on a clay road is a good thing, but the more this sand inclines to gravel the better. Good gravel would be far superior. The exact amount of sand to use will generally have to be determined by experiment in each locality. Apply the sand when the road is wet but not rutted. It will not be of much value till it becomes mixed with the clay and thus forms a sort of artificial hard pan. On the other hand, if sand is applied to hard dry clay it will be a positive nuisance until wet weather comes and allows it to become mixed with the clay. It is only suitable for roads of comparatively light traffic.

Clay on sand usually gives better results than sand on clay on account of the excellent natural drainage afforded by the sand foundation. It should be applied in a layer about six inches deep, well harrowed, smoothed off with a grader and rolled till hard and smooth. After the rolling from one to two inches of sand from the sides should be uniformly spread over the road by use of a road grader. Clay thus applied will not have reached its best stage until mixed with the sand.

Neither sand on clay nor clay on sand should be applied till the bed has been properly graded and shaped for a permanent road.

Repairs.—Repairs to this class of roads will consist in maintaining the drains and culverts in good condition and applying such material to the surface as was originally used to build the road. Care should be taken in applying this new material when filling ruts to see that it is properly leveled. If very much new material is added it is better to harrow again and re-roll.

GRAVEL ROADS.

Grade, shape and drain as above specified for the various kinds of earth roads. Then, by use of the grader, push enough of the earth from the center of the road to each side to form shoulders and at the same time make a properly shaped bed of suitable width to receive the gravel. This bed should be crowned parallel with the finished road and rolled until firm and hard before the gravel is applied.

Selecting gravel.—The pebbles composing suitable road gravel should range in size between that of grains of wheat and hickory nuts. Analysis of some of the best road building gravels of New Jersey shows them to contain: pebbles 50 per cent; sand 30 per cent; and clay 20 per cent. Gravel that has no cementing qualities is of little value for roads, especially for sand roads, while those kinds which contain too much clay are equally objectionable, particularly for clay roads. All gravels, however, have more or less value, according to the kind of soil composing the road bed on which they are to be placed. It is plain therefore, that to secure the best results a gravel should be selected especially adapted to the kind of road on which it is to be used.

A good gravel will always stand in vertical walls when the pit is opened.

After the road bed has been prepared the gravel should be applied in layers of not more than four inches in depth. Level the gravel well by hand or with a road machine, harrow till uniformly spread, sprinkle with a horse sprinkler and roll thoroughly.

Proceed in the same manner with each of the other courses till the required depth of gravel has been placed upon the road. This method will very much hasten final consolidation and make a homogeneous mass of hardened gravel and not a thin crust over several inches of loose gravel. It cannot be expected however, that gravel will pack under the roller to such an extent as will crushed stone. When the final layer has been applied the shoulders should be smoothed down and the whole surface of the road thoroughly rolled from gutter to gutter.

Repairs.—Repairs to gravel roads should begin as soon as the road is finished and be kept up in so thorough a manner as never to allow large ruts to form. A well kept gravel road will never require extensive repairs until it becomes necessary to re-surface the road by adding another layer of gravel.

MACADAM ROADS.

Grade, shape, drain, prepare the shoulders and roll the bed as already specified for gravel.

For single track country roads nine feet is an economical width and

fifteen feet is abundantly wide for a double track road. Twelve hundred cubic yards of stone will be required to build a good nine foot road, and two thousand yards will be required for the fifteen foot road. Crushed cobble stones will make five and one-half cubic yards for each cord when measured in two or more grades.

For country roads stone must be provided in at least two grades. The coarser stone may be all that part of the product passing over a seven-eighths inch screen and through a two and one-half inch screen. These stones should be placed upon the road uniformly mixed. For most country roads a six inch depth of consolidated stone will be ample, while in some cases six inches of loose stone making four and one-half inches after compacting will be sufficient. To make six inches of consolidated stone road, the stone should be applied in two layers.

Apply the bottom course after the bed has been perfectly shaped and rolled till hard, to a uniform depth of four inches. Roll dry till smooth and apply the screenings, being all that part of the product of the crusher which passes through the seven-eighths inch perforations of the screen, to a depth of about three-fourths of an inch. Apply water with a sprinkling wagon and roll till thoroughly consolidated.

After the bottom course is finished, put on the second or top course in the same manner, except that a small surplus of screenings should be applied to the top course. Water copiously and roll thoroughly; apply new screenings as the others disappear, being careful to keep the coarser stones covered, but do not use an excess of screenings. Continue the rolling till the water flushes to the surface and till fragments of rock will crush beneath the roller before penetrating the road.

Before the rolling is finished the shoulders should be smoothed down and the whole bed thoroughly rolled from gutter to gutter so as to make a uniformly crowned surface.

Crushed lime stone from the various quarries of Michigan form excellent material for the lower courses of macadam roads. If cheap enough it would be advisable to use them for the full depth of all roads where the traffic is not too severe and where the dust does not prove seriously objectionable. The best results, however, have been produced by using crushed cobble stones for the surface and these are to be recommended for all sections where they are abundant and where the price does not make the use prohibitive.

Repairs.—As in gravel roads repairs should be constant, never allowing ruts to form. Stone should be applied in small quantities, only enough to fill the slightest depressions being used. The best results are secured by applying stone for repairs in wet weather. Early in the spring and late in the fall are the best times. Stone for repairs should range in size from one-half inch to one inch. Large stones and dust are to be avoided.

CONSTRUCTION AND CARE OF CLAY ROADS.

BY A. E. PALMER, KALKASKA.

Clay and sand roads are not alike, but directly opposite in the best methods of construction and care; although the location of the line of the road, the minimum of the required grades, the building of culverts or the covering of the roads, to the end of more permanent and good roads, may apply alike to all classes of roads.

Clay roads should not be built so narrow as to cause the travel to follow the same track, because of the tendency to rut while the surface is moist and to pound up into dust in dry weather, particularly with the too narrow tires oftentimes used upon wagons carrying heavy loads; perhaps location may have an influence, but about twenty-four feet between ditches is a good average width.

The proper form for a clay road is a turnpike of one inch to the foot grade from center of the road bed to each side; more than this causes too much wash from the surface to the ditch, while less grade is apt to leave too many depressions to be filled with water, a very bad condition. These roads should be built or repaired only in the spring when the ground is wet or soft; fairly good roads are oftentimes made bad by work done during the summer months, or early fall, and this condition will continue during the balance of the year, or until another summer. In the hands of an expert the road grader is one of the best of tools in smoothing up or finishing the road bed, economical and rapid in its work, but in any other hands may be made a most destructive agent and expensive in the extreme.

In the construction and care of clay roads, water is not only the most damaging but the hardest to control of any natural element, hence, labor used in eliminating the moisture from the road bed is money well invested. In low, flat stretches of road this is often a most difficult problem.

Too little attention is given to this matter of drainage and quite often insufficient or carelessly constructed ditches are worse than none at all; that is, deep and narrow side drains with sluggish passing of the water stream, permits the soakage of the road bed from the sides, for a long time after each rain storm; it is therefore quite necessary that the work done to secure good drainage be made in as permanent a manner as possible, this is true economy. Hence, we say ditches should be constructed along all clay roads, even where the water may be present but a short time at any particular season.

A mistake very frequently made is in the digging of the ditches too narrow and too deep, rather they should be broad, and as shallow as is consistent with the ability to quickly remove the water at least three feet below the surface of the road at the center. Such ditches should be so constructed as to be constantly free for the rapid passage of the water and with the maximum fall which the general lay of the land will permit. The outlets should be kept free and carefully guarded against

filling up. The sides of the ditches are best built with an angle of about 45 degrees on either side.

In case the road is built upon a side grade, the natural flow of the subsoil as well as surface water is from the higher slope, and it is generally advisable to construct frequent cross drains or culverts under the road bed, to carry the water to the lower side and be sure that these culverts shall be large enough to meet the demand for the heaviest rainfall. See to it that they are kept free and open at all times.

Again, in long, level stretches of road, it is often money well invested, to place under the road bed one and in some conditions of soil two lineal tile drains, frequently carrying the surplus water to the side ditches by cross drains. In doing this work we are frequently obliged to change the direction of the flow by elevating and depressing the drain in stretches of from one to two hundred feet and carrying the water to the ditches from the lowest intersection of the drains, being careful to have the outlets above the normal surface of the water flowing through the ditches.

To work clay fields while in a wet condition makes the soil hard, lumpy, and out of mechanical condition for successful crop production, but this is just the exact condition we want to get for our road beds, and, the more puddling and cultivating we do on the clay road bed in the spring, the harder and smoother can the surface be made for the dry months to follow. Working along these lines will rapidly burn out and exhaust all the humus from the ground. This, too, is a desired object in making a clay road, to get rid of all the moisture-holding properties the soil contains.

In the repair of roads a bad practice usually prevails and too little attention is given to the material to be used upon the surface of the road, oftentimes the silt and grass from the ditches are scraped into the center of the road, a constant menace to the quality of the road so long as it remains, as it is simply a sponge to soak up all the water which falls upon it. Better far to throw it out upon the land on either side; generally the land would be improved by it, but the roads are not.

Where more material is needed, good practice would suggest the use of a deep subsoil from which the surface soil had all been removed, a somewhat greater expense it may be at the time, but in the end a large saving.

A mistake often made in the repair of ruts in clay roads, consists in filling of such places with stone large or small, as this practice but aggravates the trouble. We want in a clay road an evenness of material so as to avoid rutting and holes by the weight of the load being thrown first upon one wheel then upon the other, a filling of stone or like material in a mud hole simply makes the best possible condition for a deeper hole on either side of the original.

When a road is once constructed properly, never disturb it, except to keep the surface smooth and a proper form of turnpike, with an uninterrupted flow through the ditches and drains.

TUESDAY EVENING.

On Tuesday evening, Hon. C. J. Monroe, of South Haven, presided. All of the addresses were illustrated with the stereopticon. They related to the "Decoration of Home and Public Grounds" and to the more destructive insects and plant diseases.

HOME DECORATION AND CIVIC IMPROVEMENT.

BY PROF. JOHN CRAIG, CORNELL UNIVERSITY, ITHACA, NEW YORK.

In the city, the individual home is the unit. Unfortunately, there is no coordination of plan, architecturally or aesthetically from the landscape gardener's standpoint, between home dwellers, and the result is incongruity and unattractive combinations of color and structure. In the country, the homes stand by themselves so that there is no reason why each man's taste should not be given full expression because he is not likely to offend his neighbor's style by proximity. It may be truly said, I think, that the exterior of the home, whether in the city or the country, expresses with some fairness the culture of its residents. May not the drapery—nature's drapery,— climbers and vines on the outside of the house, be likened to the drapery which the home-maker or home-decorator uses in embellishing the interior? We will, however, discuss this matter more in detail later on.

Mistakes in lawn making in country homes.—One of the commonest and most unfortunate mistakes we see in the country is that the house is set too near the road. Curious, is it not, that the farmer with his broad acres should so frequently plant his house almost on the roadside as if he dwelt on a city lot? This building of the house so close to the road boundary gives cramped yards and prevents any display of good taste in lawn decoration and exterior embellishment. Another common mistake is to use bright-colored flowers in beds directly in front of the house thus breaking up the sweep of the lawn and giving a garish and spotted effect rather than an appearance of free and flowing lines. As a general rule, there are too few flowering shrubs and not enough of the perennial class of plants. These latter are the easiest of all flower-giving plants to cultivate, and one regrets to see that in the newer gardens they are less frequent than in the good old-fashioned gardens of the East.

The planning of the place.—It is important that the house should be set well up and that the land should fall away from the house slightly on all sides. Good surface drainage, as well as good subsurface drainage, should be provided. Permanent lawns cannot be secured and

maintained unless there is reasonably good surface drainage, and, of course, satisfactory cellars are never had unless the foundations are properly supplemented by cut-off tile drains.

If we would have a good canvas—lawn—on which to build our picture, we must prepare the ground carefully. There is very little danger of having it too rich; there is absolutely no danger of fining the soil too much. The more thoroughly it is prepared, the better catch of seed do we obtain. Another point is important, use plenty of seed. Stinginess in using seed is repaid by a patchy, sparse looking lawn the first year,

Fig. 3.—A Well-kept Open Lawn.

instead of an even, strong growth of grass which should appear promptly after the seeding. As to lawn seed, there is nothing better than June grass with a little timothy and white clover to help it to thicken up the first year. The June grass will soon occupy the whole ground and crowd out the timothy. It is quite safe to say that at least three bushels, and probably better, four bushels, of seed should be used per acre. Early spring is probably the most favorable time for seeding. If the soil is sandy, use the roller by all means. Do not make the mistake of applying coarse barnyard manure as to top-dressing. If some well-rotted and thoroughly broken-up loamy refuse can be found in pockets about the barnyard or in the manure pit, this can be used with advantage as a top-dressing in the fall; but otherwise, I would prefer to depend upon a dressing of bone and blood or some other nitrogenous fertilizer.

One thing I would always have in the country is a border in which I

could set in such herbaceous and ornamental plants as I desired. The informal perennial border is an exceedingly desirable adjunct to the lawn. It can be used as a screen along the boundary with excellent results. Plants may be tucked in whenever the thought occurs to the planter, or whenever the plant is secured. They may be set informally, and in this border if a weed does appear, it is not strikingly in evidence. Then, as a general plan, we should frame our lot with trees and shrubs. I would usually keep the center open. Let us have a piece of good greensward upon which to rest the eye and where the children may

Fig. 4.—A Border Framing the Lawn.

play, if they feel so disposed. Good greensward in my estimation, is much to be preferred over geranium or canna beds, although I am a great friend of the canna and think that for a border it is one of the most valuable of the somewhat recent acquisitions.

THE CIVIC IMPROVEMENT SIDE.

I would like to say a few words with special reference to the home in the village or town. It is a remarkable thing that in America where we have such marvelous opportunities for making beautiful homes, where we have such wealth of natural decorative material, where we have rainfall and sunshine to bring things to perfection, that there is so little desire displayed for beautifying our lawns and home surroundings in the town. Here and there in every town we find men and women who set shining examples in this regard, but unless there is some cooperation among city

dwellers, no large result can be expected and the well-kept home only makes the poorly-kept one stand out in more glaring contrast. The betterment of our village and town homes can only be brought about by united effort. Money alone will not do it. It is a personal question and a question which each one must ask himself. Unfortunately, we have in the majority of our towns too many persons who are of the oyster type. This oyster type of citizen takes no interest in life. The oyster leads a blameless life. He is sober; he never fought, and he does not interfere with his neighbors; he lives a peaceful life, has a good digestion and a hard head. Unfortunately, this is typical, as I said a moment ago, of many of the citizens of our towns. They live unto themselves; they interfere with nothing, and they care for nothing beyond that which disturbs their own personal welfare. But civic improvement can only be furthered by making it a personal question with each one, by asking ourselves what is the condition of our own backyard—is it a mire-hole in autumn and winter, and a weedy lane in summer; or is it a well-kept and well-graded passageway where our children can play with safety and comfort? Many backyards are simply surface sewers in that they catch the waste paper and are breeding places for germs of disease. Very frequently we find beautiful, neat, front yards and the exact opposite in the rear. Some one has suggested that places of this type might be characterized as "having Queen Ann fronts and Mary Ann backs."

Village problems.—There are so many questions coming up in the town that should be considered by the residents that it is impossible to even draw attention to all of them in the course of a single address. Many of our western towns are bleak and unshaded, but I am delighted to see that some of the towns, as in Owosso, for instance, there have been people who were sufficiently far-sighted and large-hearted to recognize the desirability of planting trees for posterity, and the maples and elms which adorn your streets will stand as monuments of the philanthropy of these people. Often serious mistakes are made in planting trees too closely on the streets. It is much better to have them forty feet apart than twenty. When set twenty or thirty feet apart, it is only a few years before they begin to compete with each other both for soil and air and the result is disastrous. I have often wondered why we should not have fruit trees on the less prominent streets as well as the ordinary shade trees. Cherries, plums and pears might all be used on residential streets and would be things of beauty in spring and probably have some utility in the fall, certainly from the small boy's standpoint. The milk supply, the water supply, baths and public library, all come within the purview and scope of the village or town improvement society. Questions which are exceedingly pertinent and which always ought to be considered are parks and school gardens because here are agencies through which the rising generations may be touched and, more than that, may be educated. The school garden is a means of drawing out the sympathetic attention of the children and causing them to grow and expand with the proper public spirit and with the proper realization of their responsibilities toward public welfare.

Work for the children.—I might call attention to some of the work which is being done by the Nature-Study Bureau of the College of Agriculture of Cornell University. For the past two years special efforts have been made to interest the children of the public schools in garden-

making. At first, their attention was directed to the possibilities of improving their school grounds. These improvements might be of the simplest order—might only mean the tidying up of the yard, piling the wood and cleaning out the fence corners. Following this the possibilities of decorative effort were introduced. Arrangements were made with seedsmen whereby children could purchase packets of seed at a nominal figure. They were instructed how to plant the seeds, and some inducement for the care of the plant was held out by offering rewards of various sorts, not of money value, however, for the best results of their small garden efforts. Without going into detail, it may interest you to know that the first year some twenty-five hundred children wrote to the person who had charge of this work telling him how they had helped to improve their school grounds. This year many thousands are engaged in the same work. The State superintendent of public instruction has lent his powerful aid and has greatly encouraged those who have been instrumental in pushing the movement. Work of this kind is possible in all parts of the country. Children are plastic and may be readily influenced, but, like older people, they must see something ahead. Inducements of some kind, whether it be moral encouragement or material rewards, must be offered.

In passing, you may like to know that there is a national society for the improvement of town and country homes. This is called the National League for Civic Improvement, which has its headquarters in Chicago and stands ready to supply all persons or societies with literature which will enable them to start a movement of this kind and give them suggestions as to how it may be carried on.

Charles Mulford Robinson, who has written an exceedingly interesting little book on the improvement of towns and cities, says that "there is no one panacea for the ugliness, dreariness, or monotony of towns and cities. There is no one road to victory; there must be parallel conquests by highway and by foothpath, by field and wood, by hill and dale. There is work enough for all, there is a place for it." The specialist seeing much in little does not see far. In zeal for pavements, one may forget trees; in zeal for parks, the thoroughfare may be forgotten, and so this is a work for the community and not for the individual. It is a cooperative movement and is successful in proportion as cooperation is real and sincere.

SOME MICHIGAN INSECTS.

BY PROF. W. B. BARROWS, AGRICULTURAL COLLEGE.

With the help of the stereopticon, Prof. Barrows showed the general appearance of a number of the more destructive insects commonly found in the orchards and gardens. The development of each was explained and their appearance in each stage described. This was preliminary to a talk upon the best methods of combatting them, as the remedy to be used in each case will depend to a large extent upon its habits and the method by which each form secures its food.

SOME FUNGOUS DISEASES OF PLANTS.

BY B. O. LONGYEAR, BOTANIST, EXPERIMENT STATION, AGRICULTURAL COLLEGE, MICHIGAN.

I would like to take the audience into the garden, through the orchard and fields, and into the woods, and while on this little journey we might admire the beauty of leaf, flower and fruit there seen. We would also meet with some unpleasing things. One of the unpleasant features of travel through oriental countries, especially to an American, is said to be the great number of beggars which swarm about the traveler in the cities. They frequent the most noted streets, lie at the doors of beautiful temples and palaces, and display their deformed limbs, or uncover their loathsome sores to the gaze of the traveler, in an attempt to excite his compassion.

In like manner, while we are gazing in ecstacy at the lovely and delicate tints of flowers and inhaling their fragrance, while delighting in the anticipations of fruit to follow, we are quite sure to find some of our plants holding out their deformed and cankered limbs or their scorched and withering leaves in mute appeal, while the scarred fruits later in the season will touch our sympathies as deeply, perhaps, as the afflictions of the beggars.

Most of the diseases to which plants are subject are due to the attacks of parasitic fungi and it is to such diseases that I shall confine myself. Probably the term fungus does not convey to most persons a very definite idea of these organisms, consequently it seems desirable to briefly discuss their nature in this connection.

Fungi are plants of a low order. Familiar examples may be found among the mushrooms, moulds, mildews, rusts, smuts and a large number of others which cause the decay of fruit, leaves and timber. The true parasitic fungi are those which exist and grow upon, or within, the tissues of living plants, and which cause so much destruction and disfiguring of our cultivated plants. Most of these fungi are very simple in structure. They consist of a vegetative part, usually composed of delicate, branching, tubular threads known as mycelium. This is the part of the fungus which does the harm to the plants on which it feeds, as it has the power not only of absorbing the nutriment from the cells of its host, but also of killing the living part of the host plant. However, in some cases the mycelium produces at first a stimulating effect on a small part of the plant attacked, so that the cells become multiplied or enlarged, thus producing various swellings or distortions of the affected portion. At the same time, the cells of the host plant at this point may become gorged with starch or other food material, which is finally appropriated by the mycelium of the parasite, thus robbing the host throughout a considerable portion.

In some cases, the mycelium does not extend far, but is localized, thus producing spots of swollen or dead tissue, which may eventually drop out thus causing perforations or deep pits. In others, the mycel-

ium rapidly penetrates, spreading to all parts of its victim, soon causing the death of the host plant. And, in still other cases, the fungus may enter the host plant when it is in the seedling stage, developing along with the host to appear in the fruit in its mature form.

After the mycelium has become well established, upon or in the tissues of its host, it usually begins the production of spores—the reproductive bodies of the fungus. Spores may form in several ways, the simplest being that in which they form on the ends or sides of little branches of the mycelium, these branches being pushed out through the surface of the affected portion.

A great many parasitic fungi produce two or more kinds of spores. One kind is produced in great abundance during the earlier part of the growing season and is capable of germinating at once, thus serving to distribute the fungus to healthy plants. The second spore form usually appears later in the season, and remains dormant through the winter to germinate in the spring, thus starting the fungus when other plants are beginning a new growth. The former have been termed summer spores, the latter resting, or winter spores.

Spores are usually produced in enormous numbers. Thus the space occupied by the head of a common pin could, if packed full of spores like those of some common puffballs, contain about eight millions of these minute bodies; while the common blue mould, which often appears on old cheese or decaying fruit, produces spores so small that more than fifteen millions of them could be placed in the same space. Their minute size enables them to float readily in the air, or to be carried on the bodies of insects or the feet of birds. Thus it is not to be wondered at that fungi appear so quickly and readily whenever the conditions are suitable for the spores to germinate.

When these spores fall into a drop of water or on a moist surface they may germinate, often very rapidly, and, if the surface happens to be that of a plant suitable for the sustenance of the fungus, it may set up the disease at this point.

Prevention of parasitic fungous diseases therefore resolves itself into the matter of preventing the germination of these spores in contact with our plants. Moreover, the careful destruction of diseased parts of plants, especially when they contain resting spores, may also serve to decrease the liability of attacks. The use of spraying mixtures to protect plants from the attacks of fungous diseases is familiar to all of you. These mixtures, the most important of which contain some salt of copper, possess the power of killing the spores of fungi with which they come in contact. Consequently when the leaves and tender parts of our plants are coated with a thin layer of such a material, the spores are unable to germinate and infect such plants. Spraying, however, must be done thoroughly in order to be of much value.

Another important means of combatting fungous diseases of plants is based on the fact that some varieties, or races, and even individual plants exhibit a greater degree of immunity from the attack of parasitic fungi than others. Hence it has been possible in some cases by selection and breeding to produce strains, races and varieties which are capable of resisting fungous parasites to a considerable degree.

The following fungi are all old offenders and are of interest to every person engaged in the growing of plants on the farm:

The strawberry leaf-spot.—The small, rounded spots of a grayish color with purplish centers which appear on strawberry leaves are due to the attack of a parasitic fungus. During the summer the fungus gives off small spores from these spots which spread the disease to healthy leaves and after these die another spore form is produced on them. This spore form lies dormant over winter, starting the disease again in spring. By destroying the old leaves many of the spores will be killed and the liability to attack reduced. This may be accomplished by burning over the rows after fruiting, with a little straw, or the leaves may be mowed off, allowed to dry and then burned. Spraying with the Bordeaux mixture is practiced by large growers.

Anthracnose of raspberry and blackberry is a common disease of the canes, especially in neglected gardens. Its effects are often very noticeable, the canes being sometimes almost covered with the canker-like spots. Such canes produce a slender, sickly growth, while the fruit production is much reduced. The disease is least apt to attack plants which are well tended; cultivation, cutting out old and diseased canes are desirable in the way of prevention. Spraying with copper sulphate before the buds start and later with Bordeaux, and with copper carbonate solution when in fruit, is recommended as treatment.

Black rot of grape.—This disease is probably the most serious with which the vineyardist has to contend. It attacks all parts of the growing portion of the vine, but is especially destructive to the fruit. The berries are affected when about half grown and soon rot, assuming a blackish color and eventually drying up, but remaining attached to the stems. These black, shriveled fruits, if left over winter on the vines, or on the ground, serve as agents of infection the next spring; thus they should be gathered and burned or turned under with the plow before growth takes place in the spring. At this time, also, the vines may be sprayed with a solution of copper sulphate and, later, when in leaf, with Bordeaux mixture, and with one of the clear copper compounds when the fruit is about two-thirds grown.

Brown rot of peach, plum and cherry.—The fungus causing this disease is probably the worst which affects the stone fruits. It is especially bad on early peaches, often causing the entire crop to decay on the trees before they are quite ripe. It also attacks young leaves and tender shoots. The diseased fruit, like that affected with black rot of grape, dries up or becomes mummyfied, often sticking together in clusters. These often remain hanging over winter on the trees to spread the disease the coming season. The diseased fruits which lie on the ground also produce a second spore form in the spring, thus giving the fungous parasite a vigorous start on the new growth of the plants.

Spraying with Bordeaux mixture has been found only partially effective in checking the disease and along with this should go careful sanitary measures in way of destroying the old diseased fruits.

Black knot of plum.—This is a very common disease of the plum, affecting the branches and causing a distorting and enlarging of the diseased part. If allowed to remain these "knots" give rise to spores which spread the disease to other branches and trees.

It can be greatly checked by cutting out the swollen, diseased parts, as soon as they appear, while spraying with Bordeaux will prevent further attacks. This fungus also attacks the wild cherry, and these trees

may harbor the disease if allowed to remain in the vicinity of the plum orchard.

Shot-hole fungus of plum and cherry is a disease affecting the leaves, causing small circular pieces to drop out, thus making the blade of the leaf appear as if perforated with shot. Several kinds of fungi cause this appearance and are capable of doing much injury to the plant. Spraying has been found quite effective in checking it.

Apple scab.—The scabby brown spots on apples commonly known by this name, are familiar to every one. They are caused by a fungous parasite which works just under the skin of the apple and, when very bad, causing distortion and cracking of the affected part. The spots are most abundant at the blossom end of the apple, due to the fact that drops of moisture remain longest here, thus enabling the spores of the parasite to germinate. It also attacks the leaves, causing sooty blotches. The spots on these leaves give rise to a winter or resting spore from which the disease starts anew the next spring.

It is especially bad in cold, wet seasons, and such seasons are the most unfavorable for controlling it by spraying. The scabby spots also allow the apples to dry out, and worst of all, make a favorable point of entrance for the spores of a number of other fungi, causing the soft rots of the fruit. One of the commonest of these "moulds"is the "blue mould" which causes a soft rot of the apples in storage, the rotting usually starting in one of the scabby spots. Stored fruit is least liable to these "soft rots" when kept comparatively dry and cold. A cellar containing a furnace is a poor one for storing fruit of any kind.

Spraying the trees early in spring and several times during the season is a paying investment for the grower of apples.

Stinking smut of wheat.—This is a serious disease in some places, being especially destructive in the wheat-growing states of the west. It does not show itself until the heads are nearly ripened when the chaff begins to stick out. This is due to the fact that the kernels are swollen, thus causing the chaff to spread apart. These kernels are dark colored and, when crushed, contain a fine black or dark brown powder with an offensive odor. This powder consists of the spores of the fungous parasite and there are enough in a few diseased heads to contaminate a good many bushels of seed wheat. These spores stick to the seed wheat, germinate at the same time as the wheat and attack the young seedlings.

Thus, to prevent the appearance of the disease it is necessary to sow clean seed. If the seed has been contaminated with smut it can be treated with excellent results either by the Jensen hot water treatment or with solutions of copper sulphate or formalin. Any of these treatments have been found very effective in killing the spores in the seed and thus preventing the smutting of the crop.

WEDNESDAY FORENOON.

This session was devoted to the discussion of problems relating to Forestry. The chair was occupied by Hon. R. D. Graham, of Grand Rapids.

NEED AND IMPORTANCE OF REFORESTATION IN MICHIGAN.

BY HON. CHAS. W. GARFIELD, GRAND RAPIDS.

In discussing the topic assigned to me in connection with this forestry session my first thought is that man's plain duty here in this world. when he touches material things, is to subdue and cultivate rather than to waste and destroy. In dealing with the earth and the productions thereof there is a plain obligation to maintain the ability of the earth to support its population without impairment. There is also an auxiliary responsibility, inasmuch as this world is the most beautiful of any world we have had to do with. The preservation of its attractions as a living place is one of vital importance. The progressive agriculturist of today emphasizes the necessity of maintaining the fertility of the soil, speaking of the soil as capital and contending that a waste of fertility is a waste of capital. The application of this principle should be patent to us all. The forest, like coal and oil and fertility, is capital stock. Production without impairment is scientific, production at the expense of a portion of the capital is wasteful and in some senses a grievous wrong.

Statistics show conclusively that the forest capital of the world has been very rapidly reduced, and while in some countries efforts have been making for repairing the loss, in our own country and especially in our own State almost nothing has been done. Still the wonderful draught is going on continuously. During the last fifty years the increase per capita in the use of wood material by our industrial nations has been remarkable. This in face of the fact that substitutes of all kinds have been suggested and employed. It is stated that the money value resulting from the mere conversion of our wood products equals at present two per cent annually of the entire wealth of the nation. If this were simply a conversion from one form of capital to another the loss would not be so important, but through wasteful methods not more than thirty per cent of the real value of the forest product destroyed appears in some other form of capital. This indicates strongly the importance of putting thought into deforestation as well as into forest recuperation. The waste would not be so terrible if it were simply measured by the loss in forest products but the incidental loss is greater than the direct one. The influence of deforestation, when carried to extreme as it is being carried in our State today, upon agriculture is vital.

The sweeping away of nearly all of our forest area brings in a new set of problems with the agriculturist that require all of his acumen to solve even in a temporary way, and in the matter of home-building we all of us today witness the effect of the scarcity of timber in the wonderfully increased expense required for erecting and maintaining the home building and its appointments. In all manufactures in which wood is an important factor, we are today feeling the pinch, and men whose living income depends upon success in this class of enterprise are wondering anxiously where their raw material is soon to come from. The farmers of Michigan see the life of their soils swept away in torrents to the great reservoirs and lost in their depths. Nothing can he do to stem the tide of this loss except through the good offices of reforestation. The expense of maintaining bridges over our streams has been rapidly increasing with the removal of our forest, as a result of the floods incident to the loss of protecting timber areas. A loss which appeals more strongly perhaps, to business interests today is that which connects itself with an irregular movement of streams, reducing thereby the water power which today is a growing factor in the great enterprises of our State. Another thing that has been given very little thought and which is growing in importance, the blowing sands shifting from one place to another as a result of taking off the protective earth cover which originally stayed the force of the winds. Our harbors are rapidly filling up with silt and increased appropriations will be required of the government to maintain them, when if a reasonable portion of the lands tributary to the river courses could remain in forest cover this expense would remain continuously at a minimum.

Among the things that appeal to me very strongly in connection with our rapid deforestation is the loss of salubrious atmospheric conditions which must appeal to every one who has experienced the cool moisture accompanying the forest area during the heat of summer. Then there is the beauty of landscape which is not mere sentiment, but has a real estimable value in any state which seeks to attract settlers within its borders to build up permanent homes. The strongest appeal, however, it seems to me, comes through the reduced resources of the State. There is nothing to take the place of this loss of forest wealth. To be sure our agricultural production has been increasing, but that would have been accomplished with just as great rapidity if a large part of the forests had been permanently saved. We offer our prayers of thanksgiving for a thoughtful Providence which has provided so completely for all of our needs. In a sense we have to do with providential methods and we are responsible for maintaining them, and we have no right to impair all of those conditions which support health, wealth and happiness, without in some measure leaving behind us some requitement for the loss.

The importance of reforestation depends very largely upon the interests to be subserved and prominent among these I mention the railroads. The volume of young timber required to furnish ties for the railroads of Michigan is enormous. We are rapidly destroying the forest that has met this requirement and we are doing absolutely nothing to restore conditions by means of which the production shall equal the consumption. This is as eminently true of the supplies needed by telephone and telegraph companies and of builders of all structures in which wood is the main factor. It is true, no matter what may be said in magnifying

the values of wood substitutes, that for the weight of the material there is nothing yet equal to wood in value for nearly all the purposes for which it is used.

We must not forget in this category of needs the fuel question. This has been unusually emphasized during the last winter. The price of wood is increasing beyond the ability of the people to pay. The anthracite coal fields will eventually give out. That form of capital will be entirely destroyed. There will be an end to the oil fields, and natural gas is already on the decline. These losses can be met in an economical and practical way through the growth of timber for fuel and, when we reflect that one hundred years growth of timber takes less of essential material from the soil than a single crop of potatoes, we can understand how our poorer soils are so well adapted to the purposes of reforestation.

I must not forget in this category to call your attention to that tremendous draught upon our timber which is today made by the pulp mills in the manufacture of material to feed the never satisfied appetite of the printing press. This is no place for statistics but, if I could throw the figures at you, you could not but be strongly impressed by the loss of capital which is daily demonstrated through the turning of wood into paper. If we had no resource for meeting this tremendous draught upon our material resources in a practical way we should, when we contemplate the future, find in it a deep source of misery. But intelligence put into the problem of reforestation finds a solution for the serious menace of the timber famine; and through the utilization of the tremendous areas of thin lands in our State we can meet the continuous requirements of a growing population for timber to the end of time.

Incidentally in connection with increasing the timber resources of the State there can be furnished a never-ending amount of employment for an army of laborers and, through the use of the product which they will conserve and harvest, there will be continued the wonderful diversity of employment which today is one of the best advertisements of our State.

I received only a few days ago a letter from a friend who is now sojourning in southern Europe, a lover of trees, a large employer of labor, and he says the most depressing thing in connection with the conditions in southern Europe is the lack of forest areas and the lost conditions of health and wealth and happiness which have resulted from timber destruction with no attempt at returning the beneficent soil cover.

I am not a calamity howler, nor am I prone to take a pessimistic view of the future, but in the few years that I have given to the study of forests and forestry I am convinced that a responsibility rests upon this generation of Michigan people to stem the tide of tree destruction, and as far as possible awaken an interest in and a love for tree planting which shall carry in its wake blessings unnumbered and which will open to the future a bright vista of promise which today is clouded as a result of ruthless forest destruction.

WHAT THE STATE CAN DO.

BY HON. E. A. WILDEY, STATE LAND COMMISSIONER, LANSING.

The forest has always been the friend of man. It furnished him the first material that sheltered him in his upward march toward civilization when he left his cave in the hills. From it he obtained the heat that warmed his rude hut and made of it the semblance of a home. With it his food was cooked and this placed him still another milestone on his upward way. Its groves were "God's first temples," and there were planted the religious beliefs that were in time to elevate man above his savage instincts. The wilderness was his refuge from enemies. Its deep recesses furnished him a safe abiding place until the time of danger had passed. With these traditions to remember it is but little wonder that a sentimental affection has sprung up to characterize man's feeling toward the forest.

The commercial value of forests has been recognized for many years; but, even among the older countries of Europe, until very recently no thought has been given their preservation with a view of establishing a permanent forest. Until lately the question of forestry has never been considered by the people of the United States from any other standpoint than how to get the most value from whatever timber might be standing on a given area. The splendid forest growth that covered a large portion of this continent when immigration began seemed an inexhaustible resource, and the settler and homebuilder deemed it an incumbrance to be gotten rid of the easiest way. With fire and axe the onslaught was made; and what would have been under the proper management a perpetual source of wealth, in all of the older states was destroyed.

The first steps taken to preserve the trees were of a sentimental character, and one who advocated the preservation of the forests was looked upon as a dreamer and enthusiast and one not capable to grapple with practical questions. Consequently his words of warning had little weight with men of affairs and legislation that has for its object an economic disposition of our forest products has been of slow growth. From the earliest history of the race in all sparsely settled countries the enactment of laws has had for its fundamental principle the protection of individual interests as against those of the government. This state of affairs is entirely proper where the sparsely settled community has natural resources apparently without limit; but the steady increase of population of countries rich in natural wealth is greatly augmented by immigration. In time they become densely populated; and if such countries are to maintain their rank, legislation must be enacted that will conserve the natural resources so that no one class shall control as against the whole.

No state in the Union had greater natural wealth than Michigan. Its lakes and rivers, forests and mines contained greater wealth than anyone could comprehend. State policies were early adopted that had for

their fundamental principle the speedy disposition of such lands as were in the hands of the State; and this too, without taking into consideration the consequences that would arise where the value of the tract consisted in what stood upon and could be removed from the land. In very many cases these lands, purchased from the State or national government on extremely liberal terms, actually became a source of expense and a by-word of reproach under a system of taxation in vogue at that period. It is my belief that had a system of forestation, having in view the preservation of large forest tracts, prevailed in the early history of our State, we would not be shipping oak from Arkansas, pine from Mississippi and Louisiana, and redwood from Oregon and Washington.

A few days since I was in one of our cities that a few years ago was one of the centers of the lumber industry. This city is situated at the mouth of one of the large streams that has its source in and runs through a country at one time covered with a primeval forest of pine that few sections could equal and none excel. There I saw evidence of what had been done in the deserted mills and sawdust piles. I listened to the stories that men employed in the good old times told, and contrasted the present situation with that of the past. The arguments in favor of a well-defined policy for our State appealed to me more forcibly than ever before. The average citizen fails to recognize the relative importance of the lumber industry as compared with other industries. No more striking illustration can be given than the assertion, which can be substantiated by the records of the census, that the annual value of our timber products exceeds that of all the gold, silver, iron, lead, coal, copper and petroleum annually produced.

There is a prevailing idea, that, owing to the increased use of iron, steel and cement in building and manufacturing, there is a falling off in the uses of wood; but such is not the case as can readily be determined when our attention is called to the various uses to which it is applied. It enters into the manufacture of paper, and for this use alone the demand for wood has trebled in the last decade. The railroads of the United States are 200,000 miles in length and for every rod of this distance no less than five ties must be placed. For this purpose no other material has yet been found so valuable as wood. For every one hundred tons of mineral mined a ton of wood must be used for bracing and supporting the mine, to say nothing of what must be used to operate the mine in other ways. Examples of this character can be multiplied but it is not necessary to do so to excite your interest and call your attention to the uses of forest products. The ultimate result of this phase of the subject is apparent to all that unless steps are taken to provide for a future supply, the manufacturing industries must suffer and the prestige of the United States along that line be lost.

What shall be done to maintain our future supply of forest products will soon be a serious problem which will demand our most careful study. The forest and water supplies, declares President Roosevelt, are perhaps the most vital internal problems of the United States. As a beginning the Interior Department has withdrawn seventy millions of acres of the public domain and are establishing forestry reserves therein. The Forestry Bureau stand ready to assist and aid municipalities and private parties in formulating practical plans for the scientific cutting of forest tracts or the replanting of cut-over lands. The State of

New York controls an area covering three millions of acres of land in the Adirondack region. Other states are following in her train, establishing reserves and encouraging private enterprise in this direction. In Michigan an interest is manifested that, if rightly directed, cannot fail to secure good results. As one result of what this agitation has already done let me call your attention to the Michigan Forestry Commission and what it desires to accomplish. This Commission was created in 1899 for the purpose of gathering statistics regarding forest products, disseminating information and creating an interest in the preservation of our forests. It is required to report to the legislature what data it has gathered and to recommend needed legislation. The Commission in 1900 recommended the establishment of a forest reservation at the headwaters of several of the larger streams of the State that have their sources in Roscommon and Crawford counties. For this purpose the Commissioner of the State Land Office was directed to withdraw not to exceed two hundred thousand acres of land in the counties named. The reasons for the selection of this location were many but the two that largely influenced the selection were: First, the fact that within this territory the State was the owner of the greater portion of the land by reason of delinquent taxes. The other, that it would in time protect the headwaters of streams flowing southwest, northwest, southeast and northeast. The tract comprised twelve townships in those counties. The location of this reserve met with determined opposition on the part of the people residing in that vicinity aided and abetted by those who desired to speculate in this class of tax title lands. This opposition resulted in a compromise between the citizens of Roscommon and Crawford counties and the Forestry Commission by which a bill has been introduced in the present legislature setting apart three townships within the original limits of the reserve. To establish this reserve the Commission has asked for the authority to purchase such lands as they may deem advisable and also to dispose of other lands within the territory defined by the bill. An annual appropriation of $7500 is asked for in order that the purposes of the bill may be carried out and the Forestry Commission given ample funds to reforest the cut-over lands and to establish fire protection for what timber now stands upon the lands or may in the future. The investigations of the Forestry Commission have led the members to believe that the most serious problem they have to contend with will be the one of forest fires. Realizing this, they ask for authority to employ one person, who shall be known as a chief fire warden, and who shall be given power in time of need to call upon such assistance as he may deem necessary in order to properly protect the reservation.

It is a question with many as to whether forest reservations can be maintained by the State without an annual appropriation exceeding in amount the value of the timber when it has reached an age profitable for marketing. In reply to this let me call your attention to the results of forest management in other countries. In Saxony the gross revenue from 430,000 acres from 1817 to 1826 was $1.75 per acre, the expenditures eighty cents per acre; from 1854 to 1863 the gross revenue was $3.54 per acre, the expenditures $1.15 per acre; from 1884 to 1893 the gross revenue was $6.67 per acre, expenditures $2.30; net revenue for this period $4.77 per acre. The gross yield of this area contributes to the budget of the State administration fourteen per cent. While this may

be greater than the revenue derived from forest areas in other European countries, none of them fail to show a profit in their management. It is not alone the value of the timber that should be taken into consideration when we calculate the benefit to be derived from the forest areas. The influence of forests upon the climate, rainfall and sanitary conditions of a county are too well known to need more than be mentioned. None of the older countries of the world in which no attention has been paid to the preservation of the forest areas have made as great progress as those that have adopted a practical state policy of planting and preserving. Spain, at one time one of the greatest of European countries with her hillsides covered with forests and her farms abounding in fertile fields, in an evil hour allowed the hills and mountains to be denuded of their forest covering with the result that, there being nothing to stay the rapid descent of the streams and mountain torrents, the hillsides were seamed and scarred by gullies, and the fertile farms alternately flooded and parched and the agricultural population became discouraged; the result being that this once wealthy and powerful nation, occupying a position of commanding influence among the leading nations of the world, has fallen so low that there are none to do her reverence. While her present condition cannot be attributed entirely to this cause, her position would be vastly better had she cared for and maintained a proper forest area. Today few of the leading nations of Europe neglect this important factor in their national wealth, the result being that a perpetual forest is established in them. If these densely populated and older countries can establish and successfully maintain forestry reserves, there is no reason why Michigan should not enact legislation that will establish such reservations and encourage private enterprise in this direction. To stimulate private parties to engage in forest preservation the Forestry Commission has drafted and caused to be introduced in the present legislature, a bill exempting from taxation not to exceed one-fourth of the area of farm land that may be controlled by one person provided such land be devoted exclusively to forest growth. If this plan should be adopted and maintained for any considerable period of time, the beneficial results cannot fail to be apparent. I sincerely hope that the legislature will enact this legislation.

In conclusion let me say there is nothing that appeals so strongly to the people as a proper observance of Arbor Day when we should each and all of us take for our motto that of the old Scotch Laird Dunbairdikes, "When ye hae naething else to do you may aye be stickit a tree."

REFORESTING CUT-OVER LANDS.

BY J. J. HUBBELL, MANISTEE.

I am requested to tell how to reforest cut-over lands in Michigan, in ten minutes, and am reminded of the monogram of a patent medicine consisting of three large S's. I shall borrow this monogram and tell you that, as applied to this problem, the three S's stand for soil, seed and supervision. With good soil, plenty of seed, and proper supervision, the problem is easily solved, but, unfortunately, these three favorable conditions are seldom found in conjunction; either the soil is very poor, or the seed is scarce, or the management bad.

The soil.—Much of the soil of the cut-over lands, especially the hardwood lands, is of a good quality, suitable for farms, and will grow fine crops of corn, wheat, potatoes, etc. The reason these lands are not being converted into farms is because the demand for lumber is greater than the demand for additional farm lands. Nature is doing much to reforest this class of lands, but they are liable to be disposed of at any time and the young second-growth timber cleared away as so much overgrown brush. There is also a large quantity of second-class lands, but it is difficult to secure even these for forestry purposes. They may some time be needed to make poor farms for poor men. There is also considerable land of very poor quality. It has been made poor by excessive burning, or it never was of sufficient fertility to grow a respectable forest. It is these lands, in particular, that it is proposed to devote to forestry and if the advocates of reforestation cannot make two trees grow where never a tree grew before, their efforts will be considered a failure. Before leaving this subject of soil, I wish to say that much of the poor land of Michigan contains elements of fertility not indicated by the amount of humus or decayed vegetable matter. There is apparently a large amount of soluble mineral elements in these lands. Tap a sugar bush, and after you have secured and boiled down a sufficient amount of sap to make a few gallons of syrup, strain it through a flannel cloth and you will obtain a considerable quantity of a gray gritty substance which is called "lime." I have never seen an analysis to know positively what this material is, but it is a mineral substance taken up by the sap and which would have been converted (if the process had not been interrupted) into good, hard maple timber.

The seed.—I once had a lady of superior intelligence propound the question, "How is it that when a pine forest is cut away, oak trees immediately spring up. Where do all the little oak trees come from?" The reply was, "Acorns." She looked astonished, and said she had asked that question of a number of men supposed to be well-informed and had always been told that it was a provision of nature that when one variety of timber was cleared away it would be succeeded by a different variety. How this was brought about by nature was something mysterious, bordering on the miraculous. All trees grow from seed. When the original forest is cut away, the seeds that lie dormant in the ground, or are

most easily distributed by wind and other elements, are most likely to take possession of the soil. Thus we see the poplar frequently coming up remote from seed trees. The seed of the maple, elm, and basswood may also be carried by the wind a considerable distance, as well as the cones from the pine, hemlock and tamarack.

I am in favor of saving as many seed trees as possible. They should be left where least liable to destruction and properly marked. If the government can mark a tree as a witness to a land corner and forbid its being cut under severe penalties, I see no reason why the State, or other authority, cannot mark seed trees and provide a special penalty for destroying the same.

This brings me to the third and last S—Supervision. It would be desirable if supervision could be determined before the original forest is cut, on account of the saving and marking of seed trees, and the sooner the work of reforestation is commenced after the cutting of the timber, the better. I am an advocate of the clean cutting of pine and hemlock lands, and also of most of the hardwood lands. Attempts to save the timber under six or eight inches in diameter have usually proved a failure in Michigan. Our original forest trees are too large, there being very few small trees in the heavy forests. The most of these are broken down in falling and logging the heavy timber. What are left standing are usually out of proportion in stems, with small tops and poor roots—or as submerged timber they are scraggy and deformed. What small timber escapes destruction in cutting is usually killed by fire, subsequently falls and furnishes material for a second burning. Nearly all the cut lands in Michigan were lumbered leaving the small timber untouched, but it has utterly failed to produce a second forest. The second point is that it should be burned over early in the following spring while the soil is still damp. The change which takes place at the surface of the ground upon the removal of the forest is a radical one. For many years the dense forest has almost excluded the rays of the sun. The zone of activity has been lifted from seventy-five to one hundred feet above the surface and about the only connection with the soil beneath has been long stems. When this forest is cleared away in a single season, the sun is permitted to shine directly upon the surface. Now, if the burning is done in the early spring, the rubbish and dry tops furnish a sprinkling of ashes to further enrich the soil and the fires do not burn deep and consume all the decomposed vegetable matter. This leaves the chopping in prime condition for seeding and this is the nick of time when the seed should be supplied, either by nature or by foresters.

The worst desolation that we have in cut lands is where the large timber was cut and the small timber and rubbish left and neglected until some time of drouth in July or August when the fires have taken place by accident, resulting in the destruction of the remaining small timber, and burning of well-nigh all the leaf-mold or humus out of the soil; also destroying the young seedlings that have sprung up since the choppings were made, and the adjacent forests having been cut away by continued lumbering to such a distance that it is almost impossible for nature to reseed the ground. These old choppings, fire-swept, destitute of seed, and sun-burned for years, constitute a hard problem in reforestation.

Clean cutting also disposes of the question of subsequent trespass and the efforts of parties to secure possession of the lands for the purpose of

stripping the same of the few remaining small trees. The finest specimens of second-growth timber we have are where the land was practically cleared—old abandoned farms, or as in the vicinity of Northport, Leland and Glen Arbor, where for years the steamers on the great lakes took wood for fuel and the timber was cut clean for this purpose. Wherever these lands were not made into farms they have made a splendid showing in second-growth timber, now from thirty to forty years old and already considered as nearly equal in value to the original timber.

To recapitulate: First, secure a good title to the best land you can get. Second, save as many seed trees as possible before or at the time the lumbering is done, mark the same and make a special penalty for destroying them. Third, insist upon the timber being cut clean when it is cut. Fourth, burn early in the spring. Fifth, assist nature to seed. Finally, guard against stock grazing, fires, and a fickle policy on the part of the State.

METHODS OF REFORESTING CUT-OVER LANDS IN MICHIGAN.

BY PROF. E. E. ROGUE, MICHIGAN AGRICULTURAL COLLEGE.

When the white man first came into Michigan to settle, his first attention was probably given to the trees, to use up and destroy them. As soon as he began to do this, he disturbed nature's plan which is to keep an equal balance in the forest, under normal and natural conditions. Nature dealt forests generously to many parts of Michigan. In some parts it would have been difficult for man to improve the stand, but it was comparatively easy for him to disturb the balance in any section. No geologist can tell us very accurately the length of time it took nature to bring forest conditions to the point at which man found them. The ripe generation which he found was about two hundred and fifty years old and this was by no means the first one.

Judging by what nature has done in some parts of this State during the past twenty-five years in her attempts at reforesting the waste areas, we may safely presume that a much longer period than two hundred and fifty years will be necessary for her, unaided, to reforest the denuded areas. To be sure, in places where there is a good start of Norway or White pine the promise is very favorable. On the other hand, in some places there is next to no promise from nature to restore the crop; namely, where there has been no seeding and no seedlings.

If we go through a tract of woods in the southern part of the State where all the merchantable timber has been removed, what do we find nature doing? We find a bountiful growth of Hard maple, a good deal of beech; many of the older trees dead at the top, some of them hollow or rotten at the butt, and scattered among these are a few young elm, bitternut, White and Black ash, basswood, sassafras, ironwood, several species of oak and many other species of less importance. The growth of nearly every one of these which attains merchantable size for lumber has been very slow. Where we have such conditions we can assist

nature a good deal by taking out the less desirable and encouraging or planting in the faster growing and more profitable sorts.

If we undertake the artificial method we have means whereby we may determine what to grow and how many trees should stand on an acre. This artificial method is about the only one that can be followed on the grassy plains. In comparatively few places at most, in Michigan, are we forced to grow less desirable trees, as is the case in many places in the west.

The method to be adopted and the specis to be grown depends chiefly upon the locality. In some places there is a fine growth of pine intermixed with birch and other less valuable sorts. Where this is the case it is simply necessary to go through and lop off the less desirable, crowding species, leaving only sufficient room for the young crowns. With stump land the problem is not quite so easy of solution. Under certain conditions, planting young pines among the stumps and roots ought to succeed. Where fire has swept through and killed one or two crops of after growth, it will be necessary to keep out this enemy and plant the most profitable trees that are adapted to the region in question. If the fire is kept out entirely the conditions would, in many cases, be next to ideal for the growth of young pines; but since it seldom is, about the only way is to dispose of the combustible material before planting. If the merchantable timber has been removed and there are only desirable species starting they should be helped by distribution or addition as the case may require.

There have been very few investigations in Michigan of sufficient importance to furnish facts upon which we can base conclusions. For sandy regions the best I have found is an acre at Grayling that was planted by Dr. Beal in 1888.

On this acre four by forty rods, were planted sixty different species, in fourteen rows four feet apart with one hundred and fifty to the row, making twenty-one hundred trees in all. The species includes both native and introduced kinds of deciduous trees and evergreens. The stand is now very uneven because they were mixed in the rows and many perished the first season. The trees have continued to die out until we are now able to form an opinion as to what is best adapted for growth in that region. The Scotch pine gave good promise for a few years, but now the largest and best tree is fast failing. The poplars have seen their best days. Many of the broad-leaved deciduous trees are gone. the most persistent of this sort is the locust. It is not growing so rapidly as in more favored situations, but it is spreading out into the grassy prairie and making a home for itself.

Some of the White cedars are looking well but not growing very fast. Some of the Norway spruce have done well. The Red cedar has done better than was expected. According to an estimate made on the ground September 2, 1902, the species that seemed most promising was Norway pine, followed in order by White pine, Norway spruce, Red cedar, Jack pine, White spruce. It took European planters one hundred years to find out that White pine was the most profitable tree for them to plant. There seems to be no question but that it is the best one for this country in regions where it will flourish.

On the Agricultural College farm is a piece of ground a part of which was formerly used as a gravel pit. It was rather rough and unproduct-

ive and too far separated from the rest of the cultivated ground of the farm to yield any profit in farm crops; in 1896 it was planted by Dr. Beal to White pine. During the fifth and sixth seasons the leaders ran up twenty-four to thirty-six inches in most cases making the total height at the time from ten to fifteen feet. At the same time a few White and Norway pine, hemlock, White cedar and locust were planted in suitable places in the woods where trees had been removed. The White pines have grown nearly as tall as those in the open. The Norways do not seem to enjoy the close companionship of Hard maple and beech. The hemlocks are coming on slowly, but fast enough that one of them was stolen for a Christmas tree last December. The White cedars are slow, as is usual. The locusts have done well.

The first plantation that Dr. Beal made was a small piece of land a part of the college campus. This was started in 1875 and we can now see results. Among the best here are the locust, chestnut, basswood and bitternut.

At Grand Rapids, Mr. Charles W. Garfield has an experimental plot planted in 1892 in which are American elm, birch, basswood, White ash, catalpa, box elder, Norway, Hard, and Silver maple, mulberry and others. This plantation affords an example of how trees planted four by four each way develop. Some have entirely died, and others are in flourishing condition. These few plantations show us more clearly what can be done with our cut-over lands than any amount of theorizing.

In any forest the aim should be to grow the most profitable trees possible. There is no more reason for growing scrub trees than for growing scrub live stock. For lumber White pine is probably the best. For posts and poles, locust, catalpa, chestnut, and Red cedar.

The time to begin reforesting the cut-over lands is now.

BENEFIT OF FORESTRY RESERVE TO CONTIGUOUS COUNTRY AND POPULATION.

BY F. E. SKEELS, HARRIETTA.

The amount of benefit to be derived from the Forestry Reserve by the contiguous country will depend largely upon the future development of this surrounding territory. It has been fully demonstrated that there is no use trying agriculture over any considerable area, and the small successes that are made are on small places protected from the winds by growths of Jack pine or the young pines, oaks and poplars that form dense thickets, wherever the fire has not destroyed them.

The grazing business is carried on somewhat extensively by one or two individuals who graze their herds of cattle over thousands of acres upon which they pay no taxes and, by bringing their cattle into the Reserve after the supervisor has made his assessments, and by disposing of them in the fall, they are able to make a small profit.

The north shore of Higgins Lake has two very pretty resorts kept up by people from Saginaw and Bay City. The cottages are nicely located

among the tall pines and rugged oaks and form with the pretty beach and deep green hue of the lake one of the prettiest pictures to be found in Northern Michigan. While these trees last, and they will last as long as protected, these resorts will retain their beauty and popularity. There is no reason why the entire region around Higgins Lake should not become as noted as are these two resorts owned by the business men of the Saginaw Valley, but before this can be brought about the barren, burned over plains must be allowed to cover their nakedness with a growth of such forest trees as the soil will produce. We naturally find all these resorters ardent supporters of forestry projects. They have enjoyed their summer outings among the pines and have seen the utter failures made by most of the homesteaders who have located along the route between the railroad station and the lake.

Higgins Lake lies in nearly the central part of Gerrish township in Roscommon county. For lack of sufficient residents to fill the township offices it is customary in this county to combine two or more towns, each six miles square into one township, and Gerrish township has two towns. In that portion east of the lake forty homesteaders have located in the last seven years; of these, less than one-half are now on their homesteads. In the town west of the lake only two families remain and the same conditions prevail in the towns north. Everywhere one finds the ruins of these abandoned homes. Some of these lands have produced fair crops, but for a year or two only, as the removal of adjacent timber seems to have had a bad effect upon farms and farmers. Around the western border of Houghton Lake, in the southeastern portion of Roscommon county, are some very good farming lands. The timber, originally hardwood, has been cut away and some good farms have been made, but as the removal of all the timber has been accomplished we find these farms suffering from a drouth brought on by the dry, hot winds from across the plains that lie to the west. While it may still be a subject for discussion as to the effect of forests on the rainfall of any given area, all agree that moisture is more equally distributed throughout the year in a somewhat wooded country than in an area destitute of trees. The scorching summer sun, or the hot, sweeping wind, rapidly evaporate all moisture with which they come in contact and within a very short period after a good shower it is difficult to find any trace of recent rainfall. Therefore the Forestry Reserve will be of great benefit to the good farming lands that may lie within or adjacent to its borders.

What can the Forestry Reserve do for the population?—pardon us while we turn on the light of the Census Bureau and try to find the people. Roscommon county has sixteen townships, Roscommon village being the only incorporated town in the county. In 1884 the entire county had a population of 2,588. In the sixteen years which elapsed before the census of 1900 the county lost thirty per cent, so that her entire population was but 1,787, and 465 of these were in the village of Roscommon. The county lies in the great pine belt that extended from Lake Huron to Lake Michigan and perhaps this decrease in population may be due to the floating population of the lumber camps. It is but fair then to compare with other counties which lie in the same belt, although most of them have much larger areas of agricultural lands. Crawford county lying north, which has two townships in the Reserve, has gained twenty per cent in these same sixteen years, although the

present population is less than 3,000 for the entire county. Otsego county on the north of Crawford, has gained sixty per cent, Ogemaw on the east of Roscommon, has more than doubled its inhabitants in the time mentioned, Clare and Gladwin on the south have increased, Clare fifty-five per cent and Gladwin three hundred per cent, while Missaukee on the west of Roscommon, has increased her population from 3,386 to 9,308 or about two hundred per cent, and Kalkaska on the west of Crawford has increased fully seventy-five per cent. All these counties were stripped of their tracts of pine at about the same time as Crawford and Roscommon. That these conditions are not brought about by the location of the Forestry Reserve in the vicinity of Houghton and Higgins Lakes is shown by a comparison with counties which have been stripped of their pines during the same period and which show relatively the same condnitions in soil, Jack pine plains, and small clumps of good farming lands as do Crawford and Roscommon counties; and in Oscoda and Iosco counties we find these relative conditions. No tracts have been set aside for Forestry purposes, in these counties, yet we find many abandoned homes the same as are found near the Reserve. During the last ten years Iosco county has lost nearly 5,000 residents, or about one-half of its present population, while Oscoda has only 1,468 residents, as against 1,904 ten years ago. The shrinkage in population in the counties which contain our Reserve, therefore, cannot be charged to the location of the Reserve, but rather to the fact that much of the land taken by homesteaders for agricultural purposes is entirely unfit for the production of the necessities of life, and those who remain must depend upon the extra fertility of some small, isolated nook, sheltered by trees from the dry winds, or gain their livelihood by their labor provided by the increasing resort business, or other newer industries which incorporate themselves within this territory.

Of such industries is the Michigan Forestry Reserve. In order to protect our holdings from fire we must build fire barriers, such as roads; nurseries must be established and the cultivated strips used for this purpose can be so situated as to protect choice locations where young timber is growing. These nurseries and the plantings must be fenced and, at critical periods of drouth, fire wardens must be employed to detect and extinguish fires before they have time to spread. All this means labor for the people who reside nearest the Reserve and none are better fitted for this work than some of the young men who are our near neighbors. Their knowledge of the country and their desire for something to do makes them the best of assistants. In the work already done the Forestry Commission has found these people very apt and convenient. The Commission has made as good a start at this work as their small appropriation would allow and all the labor was performed by these residents and the cash paid out by the State was paid to these people and by them to the business firms of the nearest village. As the work goes on, and the Forestry Commission extends its work, the amount of cash distributed to the resident population will be necessarily governed by the appropriations of the legislature. We see no reason why the county and population contiguous to the Michigan Forestry Reserve should not receive as much pecuniary benefit in proportion to the money appropriated as does the immediate vicinity of any other institution fostered by the State. The present winter has brought the matter of fuel strongly before the people of our State. We saw last week, in Che-

boygan, green block wood sold from farmers' wagons at $2.00 per cord, and this in a city once surrounded by forests, containing today the largest pile of sawdust in the State, and whose people five years ago could get their wood free by hauling away from the mills, or by going to the forests and cutting for themselves. All over northern Michigan the price of wood for fuel has been steadily advancing, until it is a fortunate man who is the owner of a wood-lot. The successful reforesting of any area contemplates a plan that requires at a certain period a thinning out process and this thinning is done at a time when the trees taken out are of a size fit for fuel. On some of the poorest classes of lands it may be impossible to grow anything but Jack pine and that only good for fuel purposes. Should the destruction of timber continue in the future, as it has in the past few years, it will be a great boon to be near enough the Forestry Reserve to take advantage of its fuel products.

In short, the Michigan Forestry Reserve with proper fostering care from the State is destined to become of great benefit to the surrounding country and its people. More, it will be the one place where tired humanity may find rest and get close to nature, and this appeals to the people of the State at large. The Reserve should become the asylum or retreat for all kinds of game, as it is now the home of a few specimens of most of the wild animals natural to the State.

Far exceeding the pecuniary benefits to be received from a proximity to the Reserve will be the comfort afforded by the forest and the communion with the outside world attracted to the Reserve.

THE FARM WOOD-LOT.

BY HON. GEORGE B. HORTON, FRUIT RIDGE.

The people of Michigan, being accustomed to forest destruction, it is not an easy matter to create much interest in so radical a change as forest preservation indicates.

Forest protection and encouragement is and must be to a considerable extent, a generous work for the benefit of those who come after us, and for the commonwealth at large. People are so intensely practical that self-interest and present benefit are too apt to become controlling factors, in most matters which embrace money values. Up to the present time, the available money there was in the trees and the productive value of the land the trees stood upon, have been the chief considerations in handling timber land. Therefore, no notions or definite plans, on the part of the citizens of the State, looking toward a general encouragement of forest growth, exist.

Even on farms where the process of chopping and clearing as a business has ceased, and the remaining few acres of wood land are intended as permanent forests, very few farmers are acting along lines of protecting, encouraging and perpetuating timber growth. Although we see an occasional farm wood-lot which gives evidence that its owner has ceased to work from the edge inward, felling every tree great and small,

a system of carelessness, and, we may say, thoughtlessness prevails to such an extent, that it can be but a short time before the whole woodlot becomes so thinned and dwarfed, that all trees remaining are of but little value, and it will soon become easy to turn it all into cleared fields.

No particular care is exercised in falling the mature trees so as not to destroy the under-growth. Trees of five and ten years growth are cut with so little consciousness of the actual destruction, as to prove the absence of any idea to encourage and save.

The work of nature in preparing for forest perpetuation is obstructed by unnecessarily clearing roads, and completely thwarting its object by unchecked fires, and by allowing livestock to browse and crush the infant oaks, hickories and maples. Because of this prevailing condition, it seems most necessary at the present time to create through writing, talking and discussing, an ambition and a desire to protect and save, instead of following the plan of exposure and destruction. As our people are practical, we must teach that timber growth and a reasonable proportionate acreage of forest is desirable for various reasons. First, forests are of great value to the State, with all its varied interests, its agriculture and its horticulture, through their tempering influence upon moisture and temperature, besides being a constant check to the spread of surface winds; through fostering springs and the sources of the little brooks and streams, which after serving to water thousands of acres of our meadow and pasture lands, go on to assist in making up the larger streams and rivers. These, in turn, furnish the great motive power that figures in no small way to make Michigan great through its manufacturing, and its commerce. As electricity generated by water-power seems destined from now on to figure very prominently in propelling and lighting, the creative force by which the electric current is to be supplied should be fostered, and we should pursue such a policy with our forests as will maintain the sources of surface water supply.

It may be said that the rivers will continue to flow if all lands were completely cleared of timber. This may be true to a considerable extent, but we all can note from observation in our own time the narrowing and shallowing of creeks and brooklets, while some have ceased to flow entirely except in times of freshet. Therefore, while we cannot and should not return to a primitive forest condition, we can encourage such an equilibrium as will best serve the public good. As our population will increase and our land will be needed for homes, and to produce the necessaries of life, judgment seems to again conclude that as a fixed and perpetual policy of our State, the forestry question should be considered chiefly from the farm and home standpoint. Living as I do in the oldest part of the State, and where the lands are already divided into home farms, it is but natural that I should become most impressed with what can be noted in those home and farm communities.

Then, secondly, a reasonably proportionate acreage of forest preserve on every farm is of incalculable benefit not only to the public, but also to the individual farm and farmer. Since the State has been so recklessly liberal in years gone by as to completely devastate its forest lands, all building and repairing timbers are more remote from us and consequently additions to costs naturally follow. Ideal American farms must possess as a part of their equipment commodious dwellings, cattle, horse, sheep, swine and poultry barns, tool houses, and a host of other buildings, mostly made of wood.

Added to this is the great question of fences. Michigan methods of mixed husbandry and crop rotation with live stock will always combat any plan looking toward open prairie methods, or even the enlargement of fields to any great extent. While the fence panel itself is destined to be of metal, for its support and anchorage to the ground it is doubtful if a more practical material than wood will be found.

Then, last, but not least, is the question of fuel. We live in a rigid climate and must have fires to warm our homes and to cook our food. In this connection we must also keep in mind that the home of the American farmer is a palace, when compared in size and appointments with those occupied by tillers of the soil in many other nations.

Thus to perpetuate all that we now enjoy within these homes it is none too soon to lay the foundation, whereby each farm will furnish its own supply of fuel. We should be wise in the present and leave for our children an independent and near-by supply, free from the dictation of the trusts or ordered strikes. If the time ever comes when farmers are compelled to resort to the peat bed or faggot it will be chargeable to a large extent, to the ruthless destruction of the last remnants of the natural forests which was God's richest gift to our beautiful peninsular State.

Along the line of economical management, it seems sound to argue that it is wasteful to take from the money already in hand to pay for some necessity which can be produced on the premises. Buildings, repairs, fence posts, and fuel are all as much farm necessities as the cereals and live stock, and in the future more than in the past will these be expensive and uncertain to obtain. The time has gone by when we can consistently argue that the land upon which the farm forest stands will, if cleared, produce more than enough to buy all the timber and fuel needed upon the farm, for, while the actual exchange at first cost value might indicate this result, there are those very important incident conditions, which given right weight in the matter would show conclusively different results.

I have heard farmers say that they could buy a hoe handle, whiffletree, or wagon box so cheap that they could not afford to make these articles which are so simple and easy to construct. Close business management causes the great meat-packing establishments to utilize and put to some use every part of the animal slaughtered, including hoofs, horns, hair and intestines, while the great manufacturing concerns of the country follow back to primitive sources every ingredient and material which enters into their products, and it is easy to see that the farmer's argument, and his practice of taking from his pocket to buy such articles as he can make or produce himself, is illogical and false.

Important as the purely financial features of this question may be, there is yet another part of it which should appeal to every person who loves the country for the beauties which the God of nature has so profusely spread over it. This may be called the sentimental side of the question but of benefit to every life. How it adds to the perfectness of the home farm if there is a relieving background of well-kept wood-land. How it charms the eye and satisfies the worldly desire of the soul to look back across the farm landscape, to the beautiful foliage border, and, just before Dame Nature goes to rest in autumn, how gorgeous are her robes of crimson and gold.

Then there are the birds, many of which live upon such insects as perplex the farmer and the horticulturist all through the season. During the summer months the birds delight the ear with their song notes, each especially tuned to play a part in the grand concert which commences with the twitter of the sparrows at the first dawning, and continues without rest until the finale is sounded by the clear notes of the robin as the shades of night are lowering. This great family of birds find shelter and nesting places in and about the woods. If we love their songs and appreciate their incalculable benefits to the farmer, we must furnish a home for them. Descriptive of the conditions which follow the fallen forest, the poet says:

"Lost are our birds; no haunts have they
In which to build and nest their young;
While the slow slug and tent-worm prey
Our orchard boughs among.

"The freed wind sweeps across the land
And beats against the homestead door,
For towering pine and maple stand
To bar its way no more.

"Bereft of shade, the meadow rill
Smaller and smaller grows each year;
The pink arbutus from the hill
Too soon will disappear.

"The earth resents our spendthrift days,
And those of us who walk behind
Through desecrated forest ways
May desolation find."

Because of the general and practical importance of the forestry question, the following is suggested: The State should take prompt and decisive action to encourage and assist farmers throughout the State to set apart a reasonable proportionate acreage for permanent forest preserves.

This encouragement, because of its public importance, should consist in part of exempting from taxation such proportionate acreage as on investigation, may be found to meet the requirements of the public good. This could be supplemented by a conservative yet effectual system of bounties on tree propagating and planting, and all upon the condition of the absolute exclusion of all farm stock and proper precaution against forest fires. It is also suggested that Farm Forestry be discussed at farmers' gatherings during the year to come, to the end that all will co-operate in establishing such a system of Farm Forest building and maintenance as will add credit to the business sagacity of the residents of our State.

THE FOREST PLANTATION.

BY CHARLES A. DAVIS, INSTRUCTOR IN FORESTRY, UNIVERSITY OF MICHIGAN.

At the outset, it may be well to say that, so far as Michigan conditions are concerned, we have practically no experimental knowledge upon which to base conclusions as to the value of forest plantations, because there are no plantations in the State which are on a sufficiently large scale to merit the name "forest plantation." It is true that a few small plantations of forest trees have been made in various parts of the State, notably upon the grounds of the Agricultural College, both at Lansing and at Grayling, by Hon. Charles W. Garfield, at Grand Rapids, and by several other people who have been interested in various phases of forestry work. These plantations are, however, mainly very small and while the results obtained in them have much that is of interest and value, they give us but litttle light upon what may be expected in a larger way from the point of view which is of most interest to all of us, namely, the financial one. We know, however, that such plantations have been very successful in other states, and we also know that trees will grow in Michigan in much the same way that they do in adjacent states, or even better, for there were no finer forests in the eastern part of the continent than those which have vanished before the hand of the lumberman and homesteader in Michigan; so we may safely infer that we can grow forest trees in large plantations with a fair degree of profit, since this is done in other states where conditions are similar to our own.

Having decided upon making a forest plantation, the first matter which should be thought out is not "what to plant," or "where," or "how," but "what for?" That is, we must decide in advance what our market is likely to be. It would be practically useless to plan, for instance, for a plantation to furnish firewood in a region where there is a sparse population, and where there are still large tracts of natural forest growth, which are yet capable of fully meeting all the requirements of the community for many years to come. On the other hand, it would be folly to plan for the production of a timber forest, which would require a long time to develop, in a community where the population was increasing rapidly in density and where towns were being built up, for much quicker and larger returns could be had here by planning for a crop of firewood for which there is always a demand in such communities and in the harvesting of which there is the least possible waste. Again, the consideration may be as to whether the plantation is to be used to supply the needs of the farm, to furnish poles, posts and other small stuff in considerable variety, calling for a number of different kinds of trees. In some sections posts for grape vines should be in great demand, in others, poles for hoops, props for coal mines, and, in still others, because of their remoteness, only timber for the general market would be expected to find ready sale.

Business considerations would naturally be next in order, and while we have not time to go into the discussion of rates of interest and the various phases of the financial side of the matter in detail, it is shown by experience that fair returns, as compared with agricultural crops, may be expected from well-managed forest plantations, the length of time before money returns begin to come in varying according to the kind of soil, the species grown in the plantation, the market for small material and such considerations, but under the best conditions, several years must go by, after the plantation is made, before any income can be expected, and the early returns will hardly pay more than the cost of the labor employed in tending the crop. After the small pole stage is reached, however, the income becomes more certain, and much larger. The age at which the pole stage is reached depends again upon the species, the soil and the other conditions of the site upon which the plantation is made, and upon the age at which the trees are set out, etc., but rapid growing species, like chestnut, catalpa and some of the inferior woods, such as poplar, elm, soft maple and box elder, reach marketable size in from eight to fifteen years on favorable soils, and, from that time until maturity, may be made to supply a reasonable income from the tract upon which they grow, while the main crop, the fully developed, mature trees, is being improved all the time.

Where shall plantations be made? This question is often asked and is not easily answered, except in a general way. Where land values are not too high, the plantation may be made upon the best soils, for trees, like other plants, will grow most rapidly and most perfectly on rich, well-drained, loamy soils, but, since this type of soil is generally too valuable for such a use, and cannot be devoted to tree plantations except under rather unusual conditions, other kinds of soil must be used. On almost every farm in Michigan there are places which cannot be profitably devoted to raising ordinary crops. Steep hillsides, often cultivated at a positive loss, both in labor, and in the destruction of richer and more easily worked land at the foot of the hill, may be much more profitably planted out to timber trees. Dry or sandy areas, which in dry seasons are useless for other crops may be used for forest plantations. Undrained hollows, if not filled with water, will support some species of trees and more extensive swampy places are much better covered with trees than left as bush pastures.

What to plant? Again a complicated matter, for soil, drainage, slope, exposure to sun, winds and frost, amount of moisture, all must be looked into. Here, too, must be considered the possible markets, the purpose for which the plantation is made, the rapidity of growth, and the general climatic conditions of the locality in which the plantation is to be made, for trees will not usually grow successfully when planted out of their normal range.

Out of seventy native species of trees which we have in Michigan, and some twenty-five or more others which will grow in the State, we have only a dozen or twenty which will grow on our poorest soils; but, fortunately, some of these rank very high, and one, the white pine, is perhaps the best general purpose coniferous tree which we have, and one making a very vigorous and rapid growth. On dry and poor soil, the black oak, the white and Norway pines, white oak and some of the hickories may be depended upon to do well. On well-drained but good soil,

catalpa, chestnut, red oak and the pines are rapid growing and valuable species, while the poplars, especially the cotton-wood, and the white maple and box elder, may be used where very rapid growing and easily obtained soft woods are wanted. For posts the Hardy catalpa is probably unexcelled for durability of its wood and the rapidity of its growth, and as it grows with perfect hardiness as a shade tree, as far north as the central part of the lower peninsula, it may safely be tried in plantations, especially if grown from northern grown seed. It should undoubtedly be tried in the grape-growing sections of the State for post material. Chestnut trees make rapid growth and furnish good returns besides, from their nuts. Various other species of nut-bearing trees may be grown in plantations, and of these, the walnut is very desirable for its timber, although said to be slow in coloring up the heart wood to a good rich color. It makes a fine growth, however, in moist soils and should be a constituent of every plantation on such soils. The sugar maple, aside from its value as a timber tree, ought to be more freely planted for its sugar, as it is in many of the eastern states. In Vermont, New York, and other states there are large maple plantations which are maintained for their sugar production alone, and which give good profits. In Michigan, on the other hand, our natural maple forests are being rapidly cleared up, and we find in our home markets maple syrup and sugar from other states and from Canada, but none from Michigan, except for a brief period in the spring. If it is profitable for Canadian and Vermont, New York and Ohio farmers to raise maples, or to let them stand, why should it not be for those of Michigan?

For wet soils we have numerous species that make good growth, most of them furnishing rather soft wood, but making excellent lumber, and of these none is unworthy of a place and ought to be absolutely rejected. In all plantations there should be a mixture of species. As a rule, those with thin, open tops should be mixed with species having dense ones, since this mixture gives best soil cover.

In starting a plantation of timber trees, if the soil has been under cultivation so that there is not a strong turf, or if it is already covered with brush, it may not be plowed or cleared; indeed, in Europe, large plantations are often made directly in grass lands. If in grass, however, it will usually be necessary to plow and fit it as well as can be afforded, but the preparation need not be as careful as for agricultural crops. In case the ground is already occupied by shrubs and small trees of less desirable kinds, these should not be disturbed, but the planting done by clearing small spaces and digging up the ground a little with a mattock or heavy hoe. Trees in plantations should be planted quite close together, in order that they may begin to shade the ground as soon as possible, the distance apart at which they are planted being determined by the cost of material, kind of soil and the use to which the plantation is to be put. Close planting costs more than open, both because it takes more stock, and more labor, hence the minimum density for good results should be determined by experiment. Unfortunately, the lack of experimental plantations in the State gives us no definite knowledge in this matter, but on good soils, probably, the young trees may be safely planted as far apart as four feet each way, and should not be planted nearer than three feet. In very poor soils, good cover for the ground is more desirable, and the plants may well be set as near as two feet apart each

way, and the growth would be much more satisfactory if they were never set more than three feet apart. Trees for timber plantations should be set when they are very young. If seedlings, that is, plants which have not been transplanted from the seed bed to the nursery, are used, they ought not to be over four years old when planted out and the per cent of loss will be less if younger plants are used. Plants once or twice transplanted are more easily moved and made to grow after moving, because of their compact root-systems, and may be safely planted out at a greater age than seedlings. In case such plants are used, however, it must be remembered that the cost of making the plantation is much increased, both because of the increased initial cost of the stock, and the greater labor in planting out the larger trees.

In case larger plantations are to be made, or a systematic planting is to be undertaken over a considerable area, for a number of years, it is much cheaper to grow the trees to be used, than it is to buy them. This is of course true in any case, but for small plantings it may not seem worth while to go to the extra pains required to grow the trees from the seed. A seed bed may be made in any convenient place where a garden bed would be located, preferably on level, well-drained soil, sandy loam or gravelly loam being well adapted to the purpose. The beds may be of any length, and about four feet wide. The seed may be sown broadcast or in drills, either way having some advantages not possessed by the other, although drilling makes cultivating possible. Seed may be purchased of nurserymen or may be gathered in the neighborhood. In general, trees which are isolated bear more often and more freely than those growing in the forest, hence such trees should be visited, at the proper season, when seed is desired. If the seeds are gathered in the fall they should be stored during the winter in a cool, dry place, like a root cellar, or, as is often desirable, they may be packed in a box, in which numerous small holes have been bored, with sand, and buried out of doors on top of a knoll. The seeds should in this case, be spread out in thin layers, alternating with layers of sand, and the whole covered with a wire netting cover, if there is danger of mice or squirrels getting at the seeds. In some cases it is well to plant the seeds as soon as gathered. This is notably the case with the elms and poplars, and some other trees, which mature seed in the spring or early summer. In sowing the seed should be covered lightly with fine soil, and at a depth depending somewhat on the size of the seed, but two or three times their own depth is usually sufficient to cover them. Seeds should be covered carefully and the soil rolled or patted down upon them to insure sufficient moisture for bringing about germination. The seedlings must be kept moist while they are in the seed bed, and should be screened when the sun is very hot in the summer. Screens made of lath answer well for this purpose. When one, or two, or at most, three years old, seedlings should be transplanted to the plantation, if it is decided not to transplant them to nursery rows, before setting them out in the plantation. This is best done in our climate in spring, but may be done in early fall. The essential thing for success, in transplanting is *care*. Care in taking up, care in handling and care in setting out again, and those plants which are least injured are the ones which are quickest to start new growth and to make good growth afterwards. In taking up, the best method is to sink a spade deep into the ground five or six inches

away from a bunch of plants and then pry up. This loosens the soil around them and they may then be pulled up carefully. The care used in pulling is dependent upon the looseness of the soil, for much less damage to the roots is done, when they are pulled from loose, light soil, than when they are lifted from compact, heavy soils.

After the plants have been taken from the ground the roots must not be allowed to dry out, even a little, since this is very bad for the plants. To prevent this, the plants are laid in piles, roots together, and covered immediately with any damp or wet cover which is most convenient. Old blankets, pieces of carpet, or even bags, may be wet and used for this purpose, or the piles may be lightly covered with damp earth, but some protection must be given, or else the plants will be badly injured, especially in sunny or windy weather, for the fine roots are very easily dried out and these are the ones which feed the plant. After a sufficient number of seedlings are ready to be taken to the planting place, they may be put into a box, root ends together, upon a layer of damp earth or other substance, and covered with wet blankets, and then moved.

In removing the plants from the box, which is best done by taking out only a few at a time, the roots should be placed in a pail of puddled soil, so as to insure their being sufficiently moist when put into the ground, and to prevent drying while being taken to the planting place. The puddled soil is made by mixing water and fine soil, muck is best, into a thin mud. This should be stirred until smooth and the roots of the seedlings, as many as the pail will hold, placed in it, and they can then be taken to the place where they are to be set out. In planting, the work can be most quickly done by two people, one to make the hole and cover, the other to carry the plants and put them in place, holding them while the roots are covered. The roots may be covered only a little deeper than they have been in the seed bed, and the earth should be pressed firmly down around them. Two men, or a man and boy, can in this way, plant from 1,500 to 4,000 trees in a day, that is, if some tool other than a spade is used for making the holes and covering.

If the plantation is made on plowed ground, it may be well to cultivate until the ground is shaded by the trees, which should be in two or at most in three years, with broad-leaved trees, somewhat longer with conifers. This cultivation is not probably necessary in our State, but would tend to hasten the growth of the plantation by preventing the growth of weeds and by conserving moisture. From this time on, the plantation will care for itself until it is several years old, depending again on species and upon site conditions, when it will be necessary to go through it and remove the poorer trees, those which are getting the worst of the crowding process, which will begin as soon as the trees have covered the ground. At this time also, it will often pay to remove the dead branches of the trees left, as this sort of pruning prevents damage later from rot, which finds its way through the dead branches to the heart-wood of the tree, and also helps to increase the value of the timber by leaving the older wood free from knots.

Of course, it is not necessary to state that timber plantations in all stages of growth, should be kept free from fires and that under no circumstances should they be used for pasture, for the damage resulting from such use would not only be considerable at any stage of growth

of the plantation but would probably end in its destruction. Two publications of the Bureau of Forestry of the U. S. Department of Agriculture may be of use to those wishing to investigate this matter further. These are "The Forest Nursery," Bulletin 29, and "Practical Tree Planting in Operation," Bulletin 27, both of which may be obtained by application to the Secretary of Agriculture, Washington, D. C.

THE HEN ON THE FARM.

BY DR. C. A. WALDRON, TECUMSEH, MICHIGAN.

The much despised hen has, by attending strictly to business, come to be recognized as one of the necessary adjuncts of the farm and is given a little credit for the good work she has done. She has clothed more farmers' families, bought more groceries and furnished more of the little necessaries of the farmers' family than any other product of the farm. The question now naturally arises how can we better care for her so that she may continue to do as well, if not better, in her good work.

It is not my intention to take up all of the different phases of the poultry question and I will leave out the broiler, roaster and the market poultry, as well as the fancy side of the question, except where it naturally comes in in connection with the question of egg production, for it is with eggs I think the average farmer can derive the greatest amount of profit.

To be successful with poultry, like any other business, one must have a liking for it, for if you do not, there are many little details that are essential to success, that you will neglect, and, before you are aware of it, lice, mites, etc., will creep in on you and you will give up the business in disgust.

If you have no liking for the hen, do not keep over thirty or forty and they will virtually take care of themselves and furnish you with the fowls and eggs for your table.

But if you have a liking that way then keep as many as two hundred or more layers, for with this number you are able to buy the necessary foods, etc., cheaper, by buying in larger quantities. You can also better afford to have the necessary machinery, such as bone grinders and clover cutters and power to run them. Never buy a bone grinder expecting to run it by hand, for if you do you will be disappointed, although they are said to run so easy it will soon become a dread for you to think of running them. You had better far buy your bone and meat already prepared.

Many persons think it is not best to try and get eggs in winter for they do not think it pays for the extra time and trouble, and that the hens will lay enough better in the summer to make it up if they are not forced in the winter. In this I think they are mistaken, for it has been my experience that it takes but a little more time and feed to get winter eggs and I do not think it materially changes the summer yield, and the

extra price for the winter eggs more than pays for the extra labor and feed. But to get winter eggs we must supply the hen with summer conditions. In the first place they must be warmly housed, and the house should be large enough so they can be confined from the first of November until all danger of frosted combs has passed in the spring, and each hen should have from four to five square feet of floor space. Thus for 100 hens you would need a house fifteen by thirty feet. The building should not be too high, for if it is the heat rises above the hens and it takes too much to heat such a house, while the heat from the hens will heat a low house warm enough if warmly built.

The building should, of course, face the south, with the windows as high from the floor as convenient, so the sun's rays will penetrate as far back in the house as possible, for the sun's rays are a great germicide. I do not think it best to have more than one-fourth of the front glazed, for the glass gives out the heat as fast at night as it takes it in during the day. Have the roosts flat, three inches wide, as close to the roof as convenient, and all on a level. The hens are then all up where it is the warmest and one is not higher than the rest. Have drop boards eighteen inches below the roosts. Have dust boxes hung up three feet from floor, a gravel bin also up from the floor is a good thing. Cover the floor with one foot of litter, either leaves, clover hay or straw. We clean our drop boards once a week and take the droppings directly to the field and spread them on the land. After the boards are cleaned, we cover them with air-slaked lime. It is claimed that air-slaked lime is detrimental to the droppings, but we would prefer to lose this than to lose the effect of the lime, for with this and the dust in the dust boxes, which is of sifted coal ashes hard, or soft, we can keep our hens and houses practically free from lice. We also paint the roosts once a week with kerosene to keep the hens' legs free from scales.

Each one can decide for himself the kind of hens to keep, and the only thing is where you are to market your eggs. If in New York, get the kinds that lay white eggs; if in Boston, a brown egg. It is best to ship to some large city, the extra expense is not much and the price received for strictly fresh, clean eggs more than pays for the trouble.

In selecting your breeders for layers, select the wedge-shaped hen, for, like the wedge-shaped cow, she will be a better producer. She should have legs standing well apart and be broad on the back.

Have the flock of hens of uniform size for if of different sizes they cannot be fed successfully, as if the large ones are fed enough to make them lay, the small ones will get too much and will soon be too fat to lay. It is best not to keep the pullets and yearlings together for the same reason, as the feed for the pullets would be too much for the yearlings.

We use an incubator and think it is easier and cheaper than hens. We leave the chicks in the incubator until they are twenty-four hours old, then remove them to a brooder in the brooder house. A brooder house is desirable as when the chicks no longer need the brooder, they can be removed and roosts put in and the chicks will have a good place to stay until they are removed to winter quarters.

We give bread soaked in milk and squeezed out dry, fed five or six times a day for the first few days, then we commence with oat meal and

johnny cake, composed of two-thirds corn meal and one-third bran, made in the usual way and baked in deep dishes. Keep fine grit in dishes, as well as milk or water where they can get it at all times. With this care, bowel troubles need not be feared. As soon as they will eat it give them cracked corn and wheat. Keep it where they can get it at all times. The cockerels are generally gone before this time, for we sell them when they weigh about one and one-half to two pounds, and they generally bring enough to pay for their keep and that of the pullets until they begin to lay, which is generally the last of October or first of November. As soon as our pumpkins will do to cook, we boil them and mix until crumbly with ground oats, corn and bran, equal parts in bulk, and one-half ounce of beef meal and bone for each pullet, and we keep this in their feeding rack all the time. We also feed this to our yearling hens at this time with a little oil cake meal added. By the first of November our pullets are ready to go into winter quarters where they stay until spring comes and all danger of chilling their combs is past.

During the winter we try to feed a little of everything. They have been having all they want, but of a broad ration. No two flocks can be fed exactly alike and produce equally good results, so we have to study our flock and watch the result of our feed. The main thing is to give them bulk enough to satisfy their appetite, and concentrated food to keep them in good condition and supply the material for the eggs and not have them too fat to lay.

Our ration this winter, for one flock of two hundred and fifty hens in one house, has been sixteen to eighteen pounds of wheat thrown in the litter after they had gone to roost so they had this the first thing in the morning. About 9:00 a. m. they got a warm feed, consisting of about fifteen pounds of fresh ground meat and bone, six quarts of warm milk, two ounces salt. This is put in a tub and well mixed, then five pounds of fine cut and steamed clover hay is added and the whole thickened by adding six pounds of ground corn and oats half and half, and at the last of the mixing two pounds of fine middlings is added. This is fed while warm in troughs, similar to old-fashioned sheep racks, only smaller, hung by wires to the ceiling, so they are easily turned over to clean, and are up off the floor.

We feed more than they will clean up at once and we do not remove what they do not eat; we want some left in the trough for them any time in the day they may come for it, for in this way they will not get in the habit of gorging themselves and then stand around and do nothing for two or three hours waiting for this to get out of their crops.

At night they get, just before roosting time, six to eight quarts of shelled corn. When we scatter this in the litter, if they seem anxious for it, they get the whole of it, but if they do not seem hungry, then we only feed a portion of it. Thus we use the corn as a sort of a governor for the amount of feed.

This makes a very narrow ration, about one to three and one-half and you have to work your hens up to this very carefully and look out for soft-shelled eggs; if you find them, one or two things are generally at fault, they are short of grit or oyster shells or they are getting too

much meat. If the latter, do not feed any meat for a couple of days and then only one-half as much for a few days, then gradually work back to the former ration. They should have clean, cool water, grit and oyster shells where they can get them at all times. We find that it pays to keep this feed up through the summer, or until the first of August when we try to get rid of the yearling hens and feed the pullets so they will moult as soon as possible and be ready as yearlings for the next winters' work.

Q. What is the cause of hens eating their eggs?

Reply by Dr. C. A. Waldron.—It is merely a habit. The kind of food has nothing to do with it.

WEDNESDAY AFTERNOON.

Hon. A. M. Brown, Secretary of the State Board of Agriculture, occupied the chair. The topics presented were "Puddling of the Soil," "New Forage Plants and Concentrated Feeds," and "The Diseases of the Cow, Horse and Sheep."

THE PUDDLING OF SOILS.

BY PROF. J. A. JEFFERY, AGRICULTURAL COLLEGE.

Most farmers understand what is meant by a "puddled soil." Indeed every farmer whose soil is a clay or a loam has had definite experience in this direction—and perhaps to his sorrow. I question, however, whether we understand just what the puddling process is, and whether we appreciate fully the evils that result from such puddling. I am therefore assuming to offer to this institute a few thoughts by way of information and suggestion.

Causes.—The puddling may be brought about by either natural or artificial causes. The natural causes are principally, (a) Beating rains; (b) The standing of water for some time upon the soil.

More than one farmer present has had a field in ideal condition for corn planting but on the eve of the planting a dashing rain has come up and so packed (or puddled) the soil that a large amount of labor was required to put the field again in shape for the planting.

The standing of water upon soil leaves it in worse condition still, and this may be made even worse by being followed by hot windy weather.

Of the artificial causes, we may mention: (a) The plowing or cultivation of the soil when it is too wet; (b) The running of stock upon fields when the soil is wet, or the hauling of loads over such soil, and (c) The failure in spring to plow at the proper time,—delaying the plowing.

Theory of puddling.—Soils, in proper tilth, are loose and crumbly. On first examination, the grains of such a soil appear to be separated one from another, or the grains may appear to be gathered in large masses or lumps, and so open does the whole soil seem that a handful of it impresses us as being light. As a matter of fact, however, what appear to us to be grains of soil are not grains, but aggregations of much smaller grains so stuck or cemented together as to form a loose open mass, but having the appearance to the naked eye of a single grain. And these small masses may be further combined into larger masses, but whatever the size of the mass, whether small or large, the important characteristic is the openness above referred to. This openness is found in all virgin soils. Nature secures this condition largely by the action of frosts, the roots of plants, the action of animal life—ants, earthworms, etc., and by the cementing influence of various salts in the soil. Chief among these cementing salts are those most desirable as fertilizers. The farmer to keep his soil in proper tilth must give nature a chance, or copy her methods. It is not often that we can improve upon them.

Let us see now what takes place in the puddling of a soil. (1) If water stands upon soil for a few days the cementing materials that hold the individual grains in these masses, are dissolved, the water itself acts as a sort of lubricant, and the individual grains of their own weight, settle down into a compact mass, which becomes more compact in the process of drying.

(2) In the case of a heavy rain the dissolving is hastened by the pounding action of the rain drops. In this case it is seldom, if ever, that the puddling occurs so completely, or so deep, as in the case of standing water upon soils.

In the case of artificial puddling:

(1) A soil may be wet enough to partially dissolve or to soften the cementing material. If at this point no further wetting takes place, or if drying begins, the soil if undisturbed would retain its openness. But if at this point a tool of any kind were put into the soil, or tramping of any kind were done upon it, the pressure thus brought to bear would slide these individual grains together and the whole mass would be compact or puddled.

(2) Perhaps the most interesting case of all is the last one mentioned above,—that of failing to plow or otherwise loosen the soil when it is in a proper moisture condition to work after a protracted moist period—usually most noticeable in spring. The sunshine and heavy winds may dry the soil too rapidly with the result that a single week of delay may cause a very bad condition of baking—or puddling.

A very interesting case of this kind is on record by Professor King. One-half of a small field was plowed April 28th and the soil was in perfect tilth and remained so. Seven days later the other half was plowed, but turned over in large clods. This last plowed ground had to be gone over twice with a loaded harrow, twice with a disc harrow and twice with a heavy roller before it could be brought into a condition even approximating what it would have had it been plowed six days earlier;

and moreover the last plowed soil and lost an amount of moisture equal to one-eighth of the rainfall of the growing season.

Evil effects of puddling.—First of all a puddled soil leads to a waste of moisture, (1) by causing large surface drainage rather than allowing the rains to pass downward into the soil, and (2) by increasing the losses by evaporation into the air.

The moisture holding capacity of a soil is greatly lessened. The puddling of soils interferes both with the germination of seeds and with the development of root systems, both of which militate greatly against crop production. The one affects the number of plants developed and the other the feeding of plants.

As has been shown already the puddling of soils increases the amount of labor required to produce a given crop—not only is more time of man and beast required to fit the soil, but more energy—more horse flesh must be used per hour. This means more feed and greater wear upon machinery.

Perhaps more important than any of these is the fact that in such a soil, ventilation is made exceedingly difficult—and slow. More and more we are coming to realize the importance of the supply of oxygen in our soils, and of the removal of carbon dioxide from the soil.

Upon these changes depend the normal germination of seed and growth of plants, and those changes that provide plant food and in considerable measure affect soil temperature.

It is hardly necessary to call attention to the fact that even with the work a farmer can give to a puddled soil, it may require years to bring it back to its original form and productivity.

From some experiments now in operation by students at the college, some interesting results have been obtained. To pass a quantity of air through puddled clay soil required some hundreds of times more time than to pass the same amount of air through an unpuddled soil, and many fold more time to pass the air through puddled loam than through an unpuddled loam.

To pass a steel point similar in shape and size to a corn plumule or tip, through a brick of clay, puddled by allowing water to stand upon it, required an average push of 18.4 pounds. To pass the point through a similar brick of loam required a push of one pound.

These bricks were circular in shape, one and one-half inches in diameter and one-half inch thick. To pass the point through the same soils unpuddled would have required almost no effort.

Precautions.—What shall we do to prevent puddling?

1st, See to it that your soils are well drained.

2d, Exercise common sense in tilling your soils—there is a time to plow and a time not to plow. The same may be said of every operation affecting the soil, and applies to the use of the cultivator, the weeder, the harrow, and the roller.

But someone objects.—It is not possible to do all these things at the right time. Occasionally this may be true—as for example, in such a season as that of a year ago. But generally it is possible; for I know a number of successful farmers in Michigan who are doing it. And if you are not, it means:

1. Poor management, or
2. Too much land, or

3. Insufficient help, or possibly two or all of them. Let me say there is only one profitable way to conduct a farm and it is to conduct it right.

Importance of the question.—How important is this subject and to what extent shall it be emphasized? The time is at hand when the farmer must secure greater average returns from his farm; he must seek to reduce the cost of production; he must learn to utilize every resource of his farm; and clearly from what has been said above, a puddled soil will not conduce to any one of these ends.

There are hundreds of thousands of acres of soils in this country today, rich in every plant food—saving possibly nitrogen—and yet unproductive. They are without owners to till them simply because they are suffering from a state of chronic puddling. They were once productive, today they are deserted and seeking owners.

There are probably many acres in Michigan at this time suffering from this same ailment.

NEW FORAGE PLANTS AND CONCENTRATED FEEDS.

BY PROF. C. D. SMITH, AGRICULTURAL COLLEGE.

As axioms leading up to the general proposition on which this article is founded, let me make these preliminary statements of generally admitted facts.

(a) On nearly all Michigan farms the rule ought to be adopted of deriving the chief revenue from the sale of live stock or the products of livestock.

(b) The function of the livestock, whether swine, sheep or cattle ought to be to convert the crops grown on the farm into more salable products.

(c) Nearly, if not quite, all the feed for the stock should be grown on the farm and only such feeds purchased as are needed to make the consumption of the home-grown products economical and productive of the greatest amount of produce of best quality.

(d) It is now generally agreed among the feeders of dairy cattle, at least, that to secure the greatest possible amount of dollars and cents from a given number of cows, or a given weight of feed, it is necessary that the feed be so combined that the mixture shall furnish somewhat definite amounts of protein per day per animal, and that the protein supply shall bear a fairly definite relation to the amounts of starch and sugar, or their equivalent, and fats.

(e) Chemical analysis has shown that some of our home-grown stock foods are lacking in protein and that we must rely largely upon the legumes to furnish us this all important nutrient.

If the truth of these preliminary statements is admitted, we are ready to begin a discussion of the various legumes adapted to Michigan as practicable sources of protein leading to another part of the paper, the discussion of the derivation of protein from commercial feeding stuffs.

CLOVER STILL IN THE LEAD.

As corn is a giant grass, the king of grasses, so clover is the king of legumes for the Michigan farmer. It is thoroughly acclimated and has demonstrated its right to be considered a prime necessity on every well-organized stock farm. Twenty pounds of clover hay with eight to ten pounds of corn meal is an almost perfect ration for a dairy cow. Early cut clover hay is well nigh indispensable for calves, and I know of no ration for fattening lambs superior to clover hay and shelled corn with or without silage. If care is taken to protect the young plant clover is a sure crop. If the seed be sown without a nurse crop in early spring on fall-prepared ground using a mixture of four parts of medium red clover to one part alsike and sowing eight to ten pounds of seed per acre, there is little risk to run and seldom disappointment. Our experiments this year show that the farmer should insist on seed grown either in Michigan or some adjacent state. Foreign seed whether grown in northern or southern European countries does not do as well as American seed. The inferiority is very pronounced and is sufficient to banish foreign clover seed from our markets.

Upon former occasions I have reported the value of the roots of clover as a fertilizer. I need but refer to our bulletin 149 and the report of the Secretary of the State Board of Agriculture for 1898 for these records. Our experiments also go far to show that none of the newer legumes can be considered dangerous rivals of clover in the estimation of stock feeders.

ALFALFA.

A canvass of the State, necessarily very incomplete, shows that the area sown to alfalfa is slowly growing in Michigan. A field here and another there has produced good crops for more than one year, demonstrating the wisdom of more wide-spread trials of this new legume by the framers themselves. The station cannot do this work for you, you must do it yourself.

It has been found advisable to sow plenty of seed per acre, certainly twenty pounds, better twenty-five pounds, getting American grown seed and carefully examining it for weed seeds, and testing vitality and germination. The seed must not be sown on land where the water table is near the surface, nor upon thin soil with hard clay sub-soil. By having the soil free from June grass, sowing thick, and clipping off the weeds a couple of times during the first year, farmers are succeeding in getting meadows that yield annually from five to seven tons of most valuable hay per acre. I have in mind in southeastern Michigan an eighteen acre field of alfalfa, two years old, producing abundant crops. Other fields farther north are doing good work. I hope that many farmers will try acre or two-acre pieces of alfalfa this year, learning how to grow it and extending the size of their crops as experience suggests.

Our field of sand lucerne is still doing business at the old stand; the crops during the past season were per acre: June 4th, 4,318 pounds per acre of dry hay; July 24, 4,706 pounds per acre of dry hay; August 5th, 3,000 pounds per acre of dry hay; Total, 12,034 pounds per acre of

dry hay. I am still recommending it for the lighter soils. The sole objection to the plant is that it takes at least two years to get it in full operation, and it does not, therefore, fit into a practicable rotation.

THE SOY BEANS.

Until this season I have never appreciated the fact that as far as soja beans, cow peas and vetches were concerned, the question of variety was the all important factor. With all these classes there are certain varieties which produce abundant foliage and stems, with little or no fruit. Other varieties have medium foliage with a moderate amount of seed and still others that seed abundantly, usually ripen early, but yield little forage. Of the first class, yielding abundant succulent forage, there are, of soy beans, the Medium Early Green soy, the Medium Early Black soy, the Flat Saya from Japan, Ito San Soy, and the Extra Early Black soy. The varieties are arranged in order of the amounts of forage produced, the heaviest yields first.

THE VETCH.

Of the vetches, the heavy yielders are : *Vicia grandiflora* and *Vicia peregrina,* among those of the smooth or *sativa* group; and, in the hairy vetch series, *Vicia biennis, Vicia disperma* and the Louisiana vetch.

The fact that the seed of the most valuable varieties is usually scarce and high in price leads me to hesitate to recommend the vetch for any purpose whatever, except perhaps for the production of seed. The forage of vetch makes a good hay, of which stock seem at times to be fond and again to reject. Much study must be given to the vetch in this country before its true place in Michigan agriculture, at least, shall be established.

THE COW PEA.

This legume is working its way northward, and there seems at this time, to be a perfect furor in favor of it as a regular member of the family of useful crops. In some sections of the State the cow pea has done well in favorable seasons. The summer of 1902 was too wet and cold for the crop, and we met with little success with it on the College farm. Again, I caution you to look after the question of varieties, selecting the Clay, Wonderful or Whippoorwill for abundant foliage. Other varieties are of the bush order, do not attain great height but seed better. Let us make haste slowly with the cow pea in this State.

SOME NEW COMMERCIAL STOCK FEEDS.

A recent bulletin from our Experiment Station reports the analysis of some of the commercial feeding stuffs of Michigan. I am sure that all feeders of livestock of any kind in the State will be interested in the matter set forth. The Bulletin is written by Professor F. W. Robison,

the chemist of the station, and sets forth in clear and simple language the various classes of feeding stuffs offered in the market, with suggestions as to what to buy and what to let alone.

In this class, oat feeds or corn-oat feeds, the by-products of the oat meal factories, play an important role. Oat hulls are the dominant features of some of these feeds. The crude fiber in some of them runs very high, showing that oat hulls have been added to dilute otherwise good feeding stuffs; such feeds as the Victor, C. and O. feeds and the Royal Oat feed come in this class. The latter contains 25 per cent of crude fibre, an amount so large as to show that it is made up very largely of oat hulls. It should be remembered in this connection that, for the most part, these purchased feeding stuffs are bought for the protein they contain, and if the feeding stuff contains less than 12 to 15 per cent of protein it ought not to be considered at all.

The feeds which excel in the amount of protein are the cotton-seed and linseed meals. They run from 33 per cent to 46 per cent protein and supply this much needed nutrient at a lower price per pound than any other feeding stuffs offered. Next these oil meals come the gluten meals, the Atlas gluten meal being the richest in protein of them all. This product is unfortunate in containing a very high per cent of crude fibre which, undoubtedly, lessens the digestibility of the other factors.

An examination of the tables published in the bulletin shows that there is no relation between the price of the feeding stuff and its real value as measured in protein content. Some of the by-products of these factories are given a high sounding name and meet with wide sale, because they are widely advertised. The business farmer will purchase none of these unless he has a guaranteed analysis; then he should compare the pounds of protein he can buy for a dollar in cotton seed meal, wheat bran, linseed meal, or even oats. The beautiful name adds nothing to the feeding value of the stuff. The old Latin adage "Let the buyer beware," applies here.

BEET PULP.

The installation of so many sugar factories provides, as one of the by-products, a material of no inconsiderable value—beet pulp. This is a very watery production containing, as usually delivered from the spout of the factory, not far from 93 pounds of water per hundred pounds of feed. When the water is extracted, the dry material has a composition almost identical with that of the dry material of corn silage, except perhaps that the crude fiber is somewhat larger. Our experiments indicate first, that livestock are fond of beet pulp; next, that, when either dairy cows or steers are put into the stable in the fall from the pasture, this very succulent food prevents the usual shrinkage and keeps the weight more nearly constant than anything else I have ever fed, with the possible exception of corn silage; third, the feeding value of pulp to fatten cattle seems to lie very largely in its effect on the health and appetite of the animal. It possesses so little dry matter in the amount which a steer can take in a day, but very little importance can be attached to that side of its work. It does keep the bowels in perfect condition and keeps the animal from getting off its feed.

The experiments with the pulp are still in progress and I do not pro-

pose here to further report, in advance, the results than to say that they indicate that the pulp is too valuable a material to allow to go to waste. You are already acquainted with the record of our former experiments and I need but to refer you to the bulletin already issued on the feeding value of raw pulp.

Dried pulp is being made at Alma and Bay City and we have found that it contains a little over seven per cent of water, with eight and one-half per cent of protein and 20 per cent of crude fiber. Our sheep are eating the pulp with avidity, and we hope to publish in the early summer the results of our experiments with this material. At present I have nothing to report except that the stock are fond of it. Other stations have been feeding beet pulp with good success, Colorado being conspicuous in this matter. Their experimenters found the beet pulp to be worth at least $1.00 per ton for their purpose, and are inclined to commend it highly to all stock feeders of that state.

PARASITIC DISEASES OF SHEEP.

BY DR. GEORGE A. WATERMAN, AGRICULTURAL COLLEGE.

In discussing this subject, "The Parasitic Diseases of Sheep," I shall confine myself to a discussion of the internal parasites, and of these I shall speak of but four. The first is the

STOMACH WORM.

This is from three-fourths to an inch in length and generally of a reddish color, when seen in the stomach; it is found in the fourth stomach, which is cone-shaped and opens into the small intestine. When present in large numbers they cause a disease known as Stomach Worm Disease.

The disease is most frequently met with in lambs, from August until the following March. Older sheep are sometimes affected to a greater or less extent, but they seem to be better able to resist the effects of the worms than the lambs. When found in small numbers they produce no noticeable effect.

The life history of this parasite is not entirely known, but it is quite certain that the lambs become infested by taking the immature worm, or the egg, along with its food or water; the pasture and drinking places becoming infested from the droppings of the old sheep, although they may not manifest any symptoms of the disease.

Symptoms.—The symptoms are not entirely diagnostic, as we get the same symptoms with other diseases, and especially with other parasitic disorders which affect the intestinal tract. Generally the first thing noticed is that the lamb becomes unthrifty, and is sometimes affected with a cough; after a time it becomes listless, does not follow the flock, becomes very poor, may have diarrhoea and finally is unable to get up, and dies. During a greater part of the time the appetite remains

good. The length of time it takes for the disease to run its course varies with the extent of infection and the constitution of the individual. They oftentimes linger from one to two months. The only way to diagnose the disease for a certainty is to hold a post mortem examination. If the stomach worm has been the cause of the trouble the parasites will be found in quite large numbers upon opening the fourth stomach. On account of the smallness of the parasite, they are sometimes overlooked. They may be mixed with the contents of the stomach, or be upon the walls of the organ, or again gathered into masses; where masses are formed they are generally at the outlet of the stomach, where it opens into the small intestine. If the animal is opened soon after death they will be found to be very active.

Importance of a post mortem.—Inasmuch as treatment is much more effectual if commenced early, and also from the fact that we get the same symptoms in other diseases, it is always best, when a number of animals in a flock show unthriftiness, to destroy one most affected and hold a post mortem in order to determine the exact cause of the disease. The others may then be treated much more intelligently.

Treatment.—A number of different preparations have been recommended in treating this disease. The old remedy and one that is yet often used, and sometimes with apparent benefit, is turpentine. The dose is from a teaspoonful to a tablespoonful given in four ounces of new milk. The animal should be fasted from twelve to eighteen hours before giving the medicine. The dose may be repeated two or three times at intervals of two or three days.

Another treatment which has come into use more recently, is gasoline. The dose is the same as that of turpentine and is given in the same manner.

Another preparation is coal tar creosote. A one per cent solution of this is used. To make a one per cent solution add ~~three~~ two ounces of coal tar creosote to three quarts of water. This is practically a one per cent solution. The dose of this (one per cent solution) is from two to four ounces, depending upon the size of the lamb. Give without further dilution in the same manner as the others.

A little care is necessary in giving medicine to sheep, not to choke them. Especially is this true if gasoline is used. The best method is for the one giving the medicine to place the sheep on its haunches in front of him and with the left hand under the chin elevate the nose a little, only enough so the medicine will flow to the back part of the mouth. Pour the medicine into the mouth from a small bottle held in the right hand.

Again I wish to emphasize that the earlier these remedies are given the more satisfactory will be the results, and hence the necessity of an early and correct diagnosis of the disease.

I also wish to recommend the use of a mixture of equal parts of sulphate of iron and sulphate of copper; this mixture is valuable as a tonic, as well as having value in destroying the worms. It can be used in connection with any of the foregoing and can be given in grain, as bran or oats. Animals infested with these intestinal parasites should always be grained. The dose of the iron and copper mixtures is about an ounce for thirty-five or forty lambs. Dissolve in a pint of water and pour over the grain, stirring it so as to get the solution evenly

mixed with the grain. Give once a day for two or three weeks, discontinue for a week, and then give again if necessary.

This mixture could be fed to the breeding ewes during the winter, if there is reason to believe that they are affected with the parasite, thus helping to rid them of the worms, and in this way prevent the infection of the lambs later on. If used during the latter part of the period of pregnancy reduce the dose.

NODULAR DISEASE.

Another troublesome parasitic disease is the nodular disease. This is characterized by the presence in the intestinal wall of small nodules varying in size from a small to a large pea; these contain a greenish, cheesy material; they are found more numerous in the wall of the large intestine, but also in the small intestine to a limited extent. We find a few of these in nearly all sheep and if present only in limited numbers they appear to do no particular harm but when sufficiently numerous to cause inflammation of the intestinal wall they cause serious disturbances. Sometimes portions of the wall will be almost a solid mass of the nodules.

The cause of these nodules is the immature form of a small worm. The adult worm, which is from three-fourths to one inch in length, is found within the intestine; these adults cause no serious trouble themselves, but, of course, are the parents of the form which causes the nodules. The disease is contracted by the lamb taking with its feed or water the eggs or young worms, which soon reach the intestine. If in the egg form they hatch and the young parasite burrows into the intestinal wall, takes up its abode there for a time; the irritation thus produced causes the nodule. After a time the young worm leaves the nodule and returns into the intestine and there completes its development into a mature worm.

Symptoms.—The symptoms of this disease resemble those of the preceding disease, in fact it is impossible to differentiate except by post-mortem. As a general thing the diseased animals live longer than when affected with stomach worms. This disease often affects older sheep.

Treatment.—As the injury is caused by the parasite while in the nodule, medical treatment is of practically no value. A tonic has a little value in enabling the animal to better resist the effects of the parasite. The treatment is of a preventive nature. If the flock is freed from the adult worm of course the lambs will not become infested. The treatments recommended in the previous disease will have their value as preventives and especially the iron and copper mixture. Other lines of prevention will be discussed later and apply to all these parasitic diseases.

TAPE WORM.

Tapeworms are another species of parasites which frequently cause losses among sheep. They are long flat worms made up of a large number of segments, and vary in length from one to twelve or more feet. They are found in the small intestine. The life history of these is unknown and hence the exact manner in which the sheep become infested is uncertain. Lambs suffer most.

Symptoms.—If the parasites are not present in too large numbers the symptoms are very similar to those of the preceding disorders and therefore the post-mortem is necessary for a positive diagnosis. If present in large numbers they may cause quite sudden death in apparently thrifty animals as they sometimes die in three or four hours after the first symptoms appear. The most marked symptom is the convulsions into which the animal is thrown.

Treatment.—The following mixture is recommended: Oil of male fern, one teaspoonful, powdered areca-nut two teaspoonfuls, turpentine one teaspoonful, new milk, three ounces. Shake vigorously. This is to be given as one dose, after the animal has fasted for at least eighteen hours. It is a very good practice to follow in the course of three or four hours with a laxative, using three or four ounces of Epsom salts dissolved in water. After administering the salts the animals may be fed. It is well to keep them in an inclosure of such a nature that any worms which may be passed can be collected and destroyed. A second treatment may be given in four or five days if it seems necessary.

LUNG WORMS.

The lung worm, another parasite affecting sheep, takes up its abode in the lungs. There are two species, one a slender white worm some three inches in length, the other from one-half to three-fourths of an inch in length.

Symptoms.—These parasites, on account of the irritation which they produce, cause more or less inflammation of the lung, and as a result, we get the symptoms characteristic of lung disorders. Coughing is quite a prominent symptom. A post-mortem is necessary to diagnose the disease. To examine for these worms, remove the lungs and windpipe, commencing at the upper end of the windpipe, open it the entire length and also follow out and open the little tubes leading out through the lungs. If the worms are the cause of trouble they will be easily detected, especially the larger species.

Treatment.—This consists of an injection into the windpipe, and is of such a nature that it requires one acquainted with the parts to administer it. I would, therefore, recommend the employment of a veterinarian.

GENERAL PREVENTION.

While, perhaps, perfect prevention is not possible, certain practices have a very marked effect in holding all these diseases in subjection.

Do not use a permanent pasture for sheep, but rather have the sheep pasture enter the crop rotation. It is not best to use the same pasture two years in succession.

Do not pasture sheep on low wet land, as it is more likely to be affected with these parasites than upland.

Change the sheep to different pastures as frequently as possible during the summer.

Do not compel the sheep to graze closely; in so doing they are apt to pick up the eggs and parasites.

If the breeding ewes are affected with any of these parasites, separate the lambs from their mothers as soon as possible and place them on pas-

tures which have not been used by the old sheep since being cropped. If ewes are badly affected, a healthy flock of lambs can be raised by not letting them at pasture with their mothers at all. Have the lambs dropped early, grow them as fast as possible before grass comes and then if it is necessary for them to remain with their mothers, turn the ewes with them twice a day for a short time, keeping the lambs in an enclosure where there is nothing for them to pick from the ground.

If the iron and copper mixture is used for a week or two, two or three times during the winter with the ewes, it will have a valuable preventive effect by ridding them of the parasites. Old sheep will harbor large numbers of these parasites without apparent discomfort, but lambs are much less able to resist their effects.

I wish again to call attention to the importance of the post-mortem in diagnosing these diseases; and again recommend that as soon as a number of the flock show unthriftiness, one or two of the worst be destroyed and a post-mortem examination made that the exact cause may be determined and treatment administered as early as possible.

DISEASES OF THE DAIRY COW.

BY DR. G. W. DUNPHY, QUINCY.

The subject of the diseases of the dairy cow covers a very wide field and I will only attempt to touch upon a few of them, particularly those incident to the period of lactation.

TUBERCULOSIS.

A few years ago, tuberculosis among dairy cattle was attracting the attention of the public to a sensational degree, owing to the generally accepted theory that the disease could be communicated to man through the medium of the milk. About two years ago, Robert Koch, the German scientist, who first discovered the germ of tuberculosis, surprised the world by making the announcement, that tuberculosis of animals could not be communicated to man; that the bacillus of animal tuberculosis was not the same as the tubercle bacillus of the human family. This announcement, although accepted by the general public, did not satisfy the scientists, and a general experimentation was started by the eminent bacteriologists.

Among the more important experiments were those of Nocard, of France. Taking a number of monkeys for his subject, he fed part with tuberculous material from cattle, and part with like material from a human subject. The animals that partook of the tuberculous material, all became affected; but it was discovered upon post-mortem examination that those that had partaken of the material from cattle were much more seriously affected, in fact showed enormous tuberculous deposits through the whole system.

Nocard's conclusions are that bovine tuberculosis is transmissible to man, and especially through the milk from a tuberculous cow.

I may say that Prof. Koch did not agree with Nocard, in this matter, but at the same time did not object to the practice of boiling milk. The burden of the proof seems to be against Prof. Koch's theory, but the matter is not entirely settled. My advice would be, while the scientists are disputing over this matter, not to take any chances, and if we have a cow in the herd that we have any suspicion of being tuberculous, to refrain from using the milk.

MILK FEVER.

I will now call your attention to some of the diseases of the dairy cow peculiar to the period of lactation.

First, I will mention one that causes more loss to the dairymen of this State than all others combined. That is parturient paresis, commonly called milk fever, or parturient apoplexy. There is still some doubt regarding the true pathology of this disease. In the twenty years that I have been in practice as a veterinarian, several different ideas of the pathology of the disease have been advanced and accepted by the profession, only to be abandoned when a more reasonable theory was advanced. For instance, Percival Dobson, and some of the older writers claimed that it was due to the blood that went to nourish the foetus, being thrown back on the system at the time of parturition, and this large amount of blood not being directed into the proper channel (viz., the secretion of milk in the udder), caused a general overloading of the blood, and congestion of the brain.

Gamgee, a later and more progressive writer on cattle pathology, claimed that it was due to a specific element in the blood, giving rise to fever, and practically blood poisoning. Still another author thinks it is due to such a derangement of the sympathetic nervous system as seldom to admit of recovery until apoplectic lesions result. Treatment based on any of these theories, seems to me only to prove their fallacy.

Of late years, a German veterinarian conceived the idea of treating the disease through the milk glands by injections into the udder. He experimented with various drugs, until he discovered that potassium iodide seemed to have the desired effect, from the fact that about ninety per cent of the affected animals treated in this manner recovered, while under the old methods of treatment forty or fifty per cent was a fair average.

I believe that the disease is due to a germ developed in the udder, a ptomaine whose rapid multiplication and development cause lesions similar to ordinary ptomaine poisoning; basing my opinion to some extent, on the fact, that any reliable antiseptic, or germicide, that can be used of sufficient strength without causing irritation to the udder, seems to have the desired effect, the arrest and control of the disease not being dependent upon iodide of potassium alone. Any other germicide that can be used without irritating the sensitive structure of the milk glands, brings about the same satisfactory results.

The symptoms of this disease are characteristic. In the early stage (which is generally a few hours after the calf is born) the animal may be noticed shifting its weight from one hind leg to the other and if

made to move, will show weakness in the hind quarters; if forced to walk will stagger and fall, and generally makes considerable effort to rise but is usually unable to regain the standing position. The eyes present a very glassy appearance, and soon become insensible to light, and even the touch of the finger does not make them show any sign of sensation. In the majority of cases, the power of swallowing is lost, and care should be taken not to give the animal large quantities of liquid by the mouth, at this stage of the disease, as it is sure to produce suffocation, or end in bronchitis, or congestion of the lungs.

Another characteristic symptom of this disease is the position of the head, which is generally pressed to the side, or shoulder, and if drawn forward, it will, as soon as released, fall back to this position.

The only successful treatment that I know of, is the application of antiseptic or germicidal medicines to the inside of the udder. The iodide of potassium is the one most commonly used, and, as soon as the animal recovers the power of swallowing, stimulants and tonics should be given. In dealing with these cases, much depends on careful nursing, such as keeping the animal from lying flat on the side, as bloating may take place, and cause death in a very short time.

As a preventive measure, I would advise letting the pregnant animal have plenty of exercise in the open air, with moderate feeding, during the period that the cow is not giving milk. Keep her from getting in a soft and flabby condition; if she is running out on luxuriant pasture, it is a good plan to take her up in the stable for a week or ten days before calving. Give her a good laxative, and then keep her on dry food that does not favor secretion of milk.

At one time I believed that a large dose of purgative medicine given just prior to the period of calving, was a certain preventive and instructed my patrons accordingly; but experience has shown that this cannot be relied on, as it does not prove effective in all cases.

COW POX.

Another disease affecting the dairy cow during the period of lactation is Variola Vaccine or Cow Pox. While this disease is not dangerous, it is the cause of considerable annoyance to the dairymen. The disease is shown, in the first place, by red spots appearing on the udder near its junction with the teats; they appear painful to the touch, and the animal may show some signs of fever. Usually a pimple forms on the center of this inflamed surface, which breaks in a few days and a scab forms which may increase to several times the size of the pimple. We want to bear in mind that this disease is infectious, and is generally conveyed from one cow to another, by the hands of the milker; consequently, we should be careful when we find a cow affected in this way to be sure and milk her last. Just pass her down to the foot of the class, so as to keep the disease from spreading as much as possible. All the treatment necessary is to use some antiseptic wash, and apply a little carbolized salve to the affected parts.

GARGET.

Another disease that I will call your attention to for a few minutes is mammitis or what is known among the dairymen as garget. This disease may be due to constitutional derangement, but quite frequently to some injury of the udder. The inflammation causes the milk to separate and the caseine, forming in lumps in the udder, frequently causes serious trouble. The treatment that I would recommend is the thorough bathing of the udder with hot water, then manipulating the hardened portion with the hands until it can be forced out through the teats. Follow up this treatment at least three times per day and give the animal a moderate dose of Epsom salts, followed up by a few doses of nitrate of potash, and apply some lotion, such as camphorated liniment with belladonna, to the udder.

Q. Is there any danger from the injection of iodide of potassium?

A. Dr. Dunphy.—Injury sometimes results if too little time is taken in making the solution. Sterilized water should be used and the tube should be treated with an antiseptic solution.

Q. What causes an abcess in the udder?

A. Dr. Dunphy.—It is generally due to external causes, such as a blow or from lying on it. Bathe the udder frequently with hot water and manipulate with the hand.

DISEASES OF THE HORSE.

BY DR. H. F. PALMER, DETROIT.

There is one thought suggested by the previous speaker regarding which I desire one word. When cow-pox appears in a herd, the most natural thing to do, is to immediately vaccinate every animal of that herd and then all will be immune to the disease. This can be accomplished by scarifying a small place high upon the udder so that vesicles will not appear on the teats. If you get one distinct vesicle the animal is just as immune as one that is entirely covered.

You cannot expect me in the short time at our disposal to enumerate all the diseases of the horse and give remedies for their treatment. I desire to confine my remarks to the prevention side of the question. A horse is simply a machine to convert raw material into energy for work. I would advise you to carefully study your horses and make yourselves familiar with the individual characteristics of each. Study the needs of the horse and do not pour down any medicine until you know the horse is sick, what ails him and what action you may expect to receive from the administration of such medicine. I desire to repeat this. Do not be continually giving your horse medicine for fear he will be sick.

This leads me to the thought of the rations of the horse. Feed a

balanced ration. There may be times when it becomes necessary to feed straw, cornstalks, or other coarse, bulky food. It is not necessary that you have a case of impaction just because these coarse fodders are used. Combine with them some food of a loosening nature, such as bran, roots or the like. Right here let me say that I do not believe one-half of our farmers know the value of bran as a horse food. So combine your feeds that the material you have in hand will make a balanced ration. The great tendency is to feed too much hay or coarse fodders. It is not necessary that a horse have hay continually before him.

COLIC.

One of the most common troubles we have to handle is the colics, those irritations along the alimentary tract which cause more or less severe pain. These are of two kinds, spasmodic and flatulent. The first is a severe contraction, usually of the small intestines, accompanied with severe pains. The usual cause of this is some intestinal irritant, and the wise course to pursue is to give a purge and get rid of this irritant. Aloes is the best horse purge we have. One ounce of pulverized Barbadoes aloes, combined with a dram of ginger, or one quart of raw linseed oil, will answer the purpose. Owing to the difficulty of giving the ball of aloes, the oil is generally preferred. The pain may have to be controlled until the purge moves the irritant. Do not give any medicine that will constipate, or tie up the bowels, such as opium, but give some anodyne that has no effect on the purgative which ought to have been given. Fluid extract of Cannibis Indica in teaspoonful doses repeated in one hour if necessary, will be found very serviceable.

Flatulent or windy colic is caused by the fermentation of undigested food. This is recognized by the heavy bloat. In such cases give the purge to rid the bowels of this undigested food and then give something to counteract the gas. Your wife's dish of common cooking soda should be drawn from. Give in large doses, two tablespoonfuls in water. If this fails to relieve, you may have to tap in order to bring immediate relief. Select the right side of the horse. Be sure you are right on the horse and left on the cow. Locate the following points: the point of the hip, the last rib, and the end of the short ribs, and strike inside of triangle formed by these three points. When the knife is plunged deeply into this part, a tube or something must be put in in order to keep the part open for the escape of gas.

CHOKING.

Another difficulty that arises, especially in the fall, is choking—the lodgment of some foreign material in the œsophagus, somewhere between mouth and stomach. Nature intended this material to go into the stomach, so simply take a piece of common garden hose and run it down the throat until the obstruction is reached, and then push it gently into the stomach. If you want to help your horse well on its journey to horse heaven, just put a block on one side of the obstruction and hit the obstruction with a mallet and I will vouch that you have helped him along a good bit.

AZOTURIA.

Another common and quite fatal disease is azoturia. After your horse has stood for a few days on high feed and is then taken out for a drive, he is found to be prompt for a short distance but soon begins to lag, sweats profusely and begins to stiffen behind, or perchance in front, and soon goes down to be drawn away, for he is not able to rise. Prevention is best in this disease. Do not let a horse stand in the barn on its usual full feed without any exercise, or its counterpart in certain kinds of medicine. When such disease does appear, a purge will have to be given to remove the rich nitrogenous material from the system.

WOUNDS.

In these days of barb wire fences we are often called upon to treat wounds of a more or less serious nature caused by unfriendly contact with the wire. In such cases, do not lose your head and think your horse is going to bleed to death just because he is losing a little blood, but examine the wound and see just where blood is issuing, whether from a vein or artery and then, if necessary, pressure can be applied above or below the wound in order to cut off the blood supply. In handling the wound have clean hands, use a clean dish of clean water, and wrap with a clean bandage. The cobwebs, so often recommended, have no place in surgery. If the blood is not easily stopped, cover the wound with a piece of cotton batting and then put on a bandage and draw it tight. Leave this in place for a day or two and then carefully remove and if you have a water supply turn the hose on the wound, dry it and dust on boracic acid. Of course, in wounds of large extent stitches will have to be put in.

CONTAGIOUS DISEASES.

Of the contagious diseases of horses, I desire to mention but one, and that is glanders. Thanks to the vigilance of our sanitary laws, this disease is of rare occurrence now, our State livestock commission having to deal with but a dozen or so cases a year. Not all the cases of snotty noses are glanders, but when this persists for months and there are sores on the legs or body and the horse is unthrifty, the case is suspicious and advice should be sought at once. If found to be glanders, the animal should be killed and the stall or barn in which the horse was located and every article that in any way directly or indirectly came in contact with the horse should be disinfected.

In conclusion, I desire to urge upon all a proper attention to the feed ration of the horse, for I realize that in this lies our greatest source of disease. Treat the horse humanely and remember that he is but slightly removed from the human. Then as you would nurse and care for one of your family, use the same principles in combatting the diseases of the horse and you will have less sickness with which to deal.

WEDNESDAY EVENING.

The addresses related to political science, the subjects being "Trusts," "A Campaign for Rural Progress," "The Torrens System," and "Indeterminate Sentences for Criminals." Hon. George B. Horton, Master Michigan State Grange, presided.

TRUSTS.

BY PROF. HENRY C. ADAMS, DEPARTMENT OF POLITICAL ECONOMY, UNIVERSITY OF MICHIGAN.

(Abstract.)

A trust is a manufacturing or commercial industry of such size, or organized in such a manner as to *dominate* the situation. The most certain evidence that an industry dominates the situation is that the price at which its goods are sold is determined in an arbitrary manner and not by the principle of competition. As further characterizing trusts, it should be added that in their present form they are, almost without exception, combinations of competing industries. Whether one approves or disapproves, this description of them cannot be denied.

After tracing the development of modern trusts and showing why their present form is that of a gigantic corporation, Professor Adams next considered their alleged advantages and disadvantages. The claim that trusts are a natural evolution of industry, and should on this account be left undisturbed by the legislature, was summarily dismissed on the ground that an added step in the development of industrial form may require, for the protection of the people, an added step in the development of political restraints. The claim that large capital is necessary for economic production was also conceded, but attention was called to the fact that all the essential elements in economic production may be attained this side of an aggregation of capital necessary to dominate the market of seventy-five millions of people. The argument that "potential competition" persists even after actual competition has been killed, was set one side, as unworthy the consideration of an economist. The consideration that trusts are necessary in order to adjust the supply to the demand, and by this means to obviate panics and commercial depressions, was admitted to be plausible, but attention was called to the fact that the only means of adjusting supply to the demand, in harmony with the interests of the mass of people, is to provide for an increase of demand rather than for the curtailment of supply. The theory that supply must be curtailed is pernicious in principle and must ultimately result in the destruction of the motive for industrial progress.

In discussing the evils of trusts, the speaker passed over all minor criticisms and called attention to the fact that when an industry, either by its nature, the amount of capital which it controls, or the character of its organization and agreements, rises superior to the normal control of competition, it ceases longer to be in harmony with the fundamental principles of English jurisprudence upon which industrial, as well as political institutions in the United States are based. "For my part," said the speaker, "I fail to appreciate the beneficence of industrial feudalism; I prefer industrial democracy."

In the discussion of remedies, attention was called, first, to the fact that education, especially higher education in commercial branches, would do much to relieve the situation by building up a large class of strong men who will compete with one another for the control of those unusual advantages which the modern form of industrial organization presents. The universities, especially the State universities, are playing their part in the ultimate solution of this great problem.

Attention was next called to the fact that no solution of the trust problem can be expected until railroads are compelled to treat all shippers alike. Railway discriminations and the absence of any rational principle in the adjustment of railway rates lie at the bottom of many of the trust evils. So far as direct anti-trust legislation is concerned, the difficulty lies in the fact that the jurisdiction of the federal government over the one in which state corporations manage their affairs is at present open to question. The Littlefield bill, presented at the present session of Congress, claimed this jurisdiction and failed to receive the approval of Congress, while the administration bill, which received the approval of Congress fails to touch the vital question.

A CAMPAIGN FOR RURAL PROGRESS.

BY KENYON L. BUTTERFIELD, PRESIDENT R. I. AGRICULTURAL COLLEGE.

While it is perhaps unnecessary to remind this audience of the great progress which agriculture in the United States has made during the past half century, or of its present importance as an industry, I wish, for the sake of my argument, to recall to your minds some facts which demonstrate the advancement that has taken place in American agriculture and the high position that it still holds. For we find that agriculture has developed at a rapid rate in spite of severe depressions in the business. For instance, while the population of our country during the past fifty years has increased 323 per cent, the acreage of improved farming land has increased 367 per cent, the number of farms 400 per cent, the value of farm implements 503 per cent, the value of farm property 516 per cent, and the value of live stock 565 per cent. According to the last census, the farm property of the United States is valued at something over twenty billion dollars, which about equals the capital invested in all our manufacturing enterprises and railway lines combined. The annual produce of our agriculture is worth nearly four billion

dollars. The enormous growth of our country in manufacturing, and its present first rank among the nations of the earth in that industry, are largely due to our varied and abundant agricultural resources; the farms furnishing eighty-one per cent of the raw materials used in manufacturing. A large share of the value of the freight carried by our transportation systems is made up of agricultural products. Two-thirds of our gigantic export trade is in the products of the farm. The enterprises of meat-packing and flour-milling, which are immediately dependent upon the farm for raw material, have grown to enterprises that rank next to iron and steel in gross value of product. Science is being successfully applied to the business of agriculture, and the development of so called agricultural science is one of the marvels of our recent educational history. In fact we are warranted in claiming for agriculture as a business a first position among the industries of our country. Moreover, half of our people are still rural people and over a third of our workers are engaged in agriculture.

But there are tendencies in American agriculture about which we cannot so fully congratulate ourselves. I do not refer particularly to the periodical depressions in agriculture, nor to the trials and tribulations of individual farmers. There are several tendencies, however, which seem to indicate that in spite of our agricultural progress there are serious questions arising which the American farmer must face. In the first place, agriculture is of relatively diminishing importance. In the value of the gross product, manufacturing passed agriculture some fifteen years ago. The agricultural population becomes relatively smaller each decade. These facts in themselves need not alarm us, because it can easily be shown that under certain conditions such facts would really favor the farmer. But we know that in spite of agricultural education, in spite of our public schools, in spite of farm papers, there is still a vast deal of poor farming. We know, too, that in some lines of farming the competition of other countries has been very serious. We also have to face the fact that in many important agricultural communities the farming population is actually diminishing. During the last decade twelve states lost in rural population, and these twelve states included not only some of our eastern states, but such great agricultural sections as Ohio, Indiana, Illinois, Nebraska and Kansas. We find also, according to census figures, quite a marked increase in tenant farming, and it is now claimed that 37 per cent of our farms are not worked by the owners.

It is not the purpose of this paper to discuss the agricultural status in any detail. I have simply suggested these facts in order to emphasize the idea that we really have such a thing as the rural problem. It might be interesting and profitable to discuss the industry of agriculture, if all we had to talk about was the progress and importance of the business, but I am sure that the mere statement of the darker side of the picture, which I have merely hinted at, is sufficient to convince every farmer at least that there is an agricultural problem. It is this matter of poor farming, this question of competition, this pressure of other business, this question about the organization and conduct of our industrial and transporting industries, the gradual decline of farming population, the increase in tenant farming—it is these phenomena, and others like them, that convince us that there are serious questions confronting the American farmer.

I also want to suggest that the American farm problem is in large

part a social problem. What I mean is this, that while from the economic standpoint the desirable thing is to have a prosperous agriculture, to make the business of farming a profitable and successful business, nevertheless the real end to be held in view, and indeed the real method of bringing about an improvement in our farming, consists in those means that will improve the farmers. The methods which urge and stimulate the individual farmer and the whole body of farmers to better farming, to a higher standard of living, to higher aims, to better education, are the methods which will improve our agricultural industry. Of course, the industrial and the social progress must go together. I do not deny the efficacy of more correct farming in building up our agriculture, nor do I deny the place of proper legislation in making the conditions of the industry more profitable. But back of correct farming lies a more intelligent farmer. And before you can have adequate legislation for the benefit of farming, you must have a body of thinking farmers organized to secure their rights. I also speak of the problem as a social problem because the means for improving the farmer are largely what we would call social means; they depend in great degree upon the co-operation of individuals, upon social institutions. That this last statement is true is proved, I think, by the great development, especially during the past decade, of such social agencies as our farmers' organizations and the various means for agricultural education. They would not develop as they have developed unless they were of use.

Let us now go over very hastily some of the agencies already organized that are assisting in the rural progress in our country. Take, first, those things that are making communication in rural districts easier. Whatever views we may have upon the various methods of securing good roads, I think we must admit that our roads are gradually improving and more important yet, that our people are gradually getting together on the question of organizing the good roads movement. I think the subject of good roads as preached by our greatest advocates of road improvement is better received by farmers than ever before. We have also seen during the past half dozen years one of the most wonderful movements affecting farmers that has ever taken place in the world's history; I refer to the marvelous development of the free rural mail delivery system. I do not think that the word revolutionary is too strong a word to use in discussing the effects of this system; and the fact that in four years more we shall see the great bulk of our farmers enjoying the benefits of this movement is one of the most hopeful facts that I can imagine relative to the future of American rural life. The telephone is also getting to be an ordinary article of household furniture in many rural communities, and has the power of conferring many benefits relating not only to business but to the social side of farm life. Electric railways are not being built as rapidly as was predicted a few years ago, and it is probable that in the near future the new lines will simply parallel existing steam railway lines; yet the influence of these railways is already far-reaching, and it is the general testimony of those who know that their influence upon the farming territory which they penetrate is almost wholly salutary.

It is not necessary to dwell in this presence upon the benefits of farmers' organizations. It is probable that no state in the Union is as thoroughly organized in this respect as is Michigan. Michigan easily ranks first in the importance and thorough organization of its farmers'

club work, and Michigan during the past half dozen years has made the greatest progress in Grange work of any state in the Union. Probably fifty thousand rural people are enrolled in these two organizations in Michigan. The farmers' organization in spite of its success, however, is still a neglected factor in our agricultural development. I believe it must be much more fully used than it has ever been if we are to get our best rural progress. The farmers' organization enables the farmers to get things for themselves, to secure benefits in many lines that they could not secure in any other way. It gives them, also, an education in the ways of the world, in co-operating, in broadened views, in wider acquaintance, that no agricultural college, nor rural school, nor farmers' institute, nor experiment station, nor agricultural paper, nor country church, nor any other power can possibly give.

The rural school is a subject that is being talked about today by farmers perhaps more than any other one subject, and this interest in the rural school question is of itself an acknowledgment of the need of improvement. I cannot stop to discuss, even briefly, any special phase of this question, except to assert with a good deal of emphasis that this agitation for better rural schools has come none too soon. I do not by this assertion class myself with those who can see no good thing coming out of "the little red schoolhouse." But during the past twenty years the school has come to mean quite a different thing in our American civilization than it has ever meant before; we are just beginning to appreciate the need and value of education in training for the whole work of life. Therefore merely to "keep up with the procession" means that the rural school must go forward rapidly.

Agricultural education has also made remarkable progress within the past ten years. The experiment stations are now on an established basis and the farmers are generally friendly to them. The Department of Agriculture is already a stupendous affair, and its work is apparently just begun. Our agricultural colleges have entered upon an era of prosperity; extension work in the form of institutes, correspondence classes, home study courses, and so forth, is gradually getting into shape as a distinct phase of the agricultural educational movement.

When we turn to the country church we have to confess, I think, that there has not been as much progress as there ought to have been, and that the country church as a whole is not meeting completely the demands that are placed upon it by the rural problem. I note, however, that in certain parts of our country, especially in New England, there are signs of an awakening upon this subject. In several cases the country pastors are taking leadership in the farm community and making of their churches centers not only of religious life, strictly so called, but on their church altars they have lighted the fires of a general intellectual and social advancement for the farmer.

Now I have described very hastily the status of the farm problem and outlined almost superficially those chief social agencies that are making for rural progress. I have been thus brief because I assume on your part an appreciation of the situation as I have outlined it. The real purpose of this paper is to urge a more general and broader study of the farm problem, and to inspire, if possible, to more complete co-operation among the agencies which are deemed indispensable, if our American agriculture is to keep pace with our advancing American civilization. In this connection I want to make some practical suggestions.

First of all, I wish to urge the study of the rural problem in the light of the idea that it is a social problem; that the farmer is of more consequence than the farm and should be first improved. This study involves what for want of a better term may be called the study of rural sociology. It means the study of the conditions that surround our farm life; the advantages and disadvantages of rural life; the effect of rural life upon the farmers themselves, and upon the chances for success of those young people who leave the farm and go to the city; it means the study of the movement of the farm population from country to city, and the causes and results of the movement; it means a study of the traits developed by a life upon the farm, and the influence of these traits in the progress of agriculture. It means the more thorough study of the social agencies which I have mentioned, such as farmers' organizations,—their history, purposes, methods and achievements; the problems involved in the rural school question,—including taxation for the support of rural schools, the centralization of rural schools, and rural high schools; it includes agricultural education in all its phases and in all of its possibilities; and it includes the country church, involving one of the most difficult and at the same time one of the most important problems that we have to deal with. Now, the study of all these things may be put under the head of "rural sociology," and it seems to me that in order to understand the rural problem adequately, we must have some notion of this subject. And while this subject should be studied first of all by the farmers, I think it is equally important that our teachers,—especially our country teachers; that our ministers,—especially our country pastors; that our editors,—especially the editors of farm papers and of the so-called country papers; and, in fact, that educated people generally, shall have more correct and adequate notions of the social phases of agriculture. It seems to me that these things are essential if we are to have a campaign for rural progress. That there is an aroused interest in these subjects among the farmers is proved by the discussions that take place in farmers' club, in Grange, and in institute; and that they are of interest to others than farmers is proved by the value and frequency during the past three or four years of magazine articles bearing on these lines of thought.

In the second place, it is necessary that the social agencies for rural advancement which I have been talking about must be pushed with all possible zeal and energy. In spite of progress in farmers' organizations in Michigan, it is doubtful if more than one voting farmer in ten is a member of either grange or club. In the great Mississippi Valley today, the heart of our agricultural empire, there hardly exists such a thing as a general farmers' organization. I do not believe we can look for substantial rural progress until we see our farmers realizing the absolute necessity of organization. The problems pressing upon our rural schools must not be settled hastily, but they must be settled. The rural school ought to be as good a school as exists, the boy and girl born upon a farm ought to have as good an opportunity to secure training for life as if they had been brought up in the city. In agricultural education, in spite of the great advances that have been made, we find an almost ridiculously small number of young men in our colleges and schools fitting themselves for farm life; and while the outlook is full of hope we have to confess that in agricultural education we are merely getting under way. We have to face the scorn, and what is worse, the lukewarmness of a great multitude of farmers. On the religious side we have to meet in the rural

communities the fact of extremely small churches, of great conservatism in the pews, of extremely small salaries for pastors, and of sectarian jealousy and discord. Real rural progress can come only when these various social agencies begin to do the work that is possible for them to do, and begin to receive the enthusiastic support of the great mass of farmers that they ought to receive.

In the third place, it is necessary to get firmer hold of the idea that no one of these agencies is sufficient. We must have a movement of the army all along the line. We must have a campaign for rural progress that involves the forward movement of every phase of rural development. And while as individuals our chief interests may be with the farmers' organization, or with the country school, or with some form of agricultural education, or with the country church, or with the development of some phase of rural communication, or with the economic problems of marketing, it is nevertheless important that we shall appreciate the fact that we are working at but a section of the question, that we are but a division of the army and that there is no one patent medicine that will cure the ills that our agriculture may be heir to.

We ought now to be in condition of mind to appreciate the opportunity that there is for securing co-operation of all these forces, to believe that it is perfectly legitimate for people who are not farmers to have an interest in this question, to see that not only must the farmers help themselves, but that they can and should profit by the services of their teacher, of their pastor, of their editor, and even of city people. There is no reason why joint meetings of all these classes may not be of value. There is no reason why the farmer should resent proper interest on the part of these classes. We cannot, for example, have the right kind of rural school until we have a body of rural teachers who see beyond the four walls of their school room,—the rural teacher must have an intelligent sympathy with the problems of the farm. The same thing is true of the editor of the country paper; of the pastor of the rural church; and of the professor in our agricultural college.

There is involved in this discussion a more important question than any I have yet suggested. It can merely be referred to. The real problem in our agriculture is whether the type of independent American farmer can be preserved. The "American farmer" as he may be called, is distinctly a middle-class man. Now in our rapid social and industrial changes is he going to maintain himself as a middle-class man, as a yeoman; is he going to be able to own his own land, to be a capitalist as well as a laborer, to have a fairly high standard of living, to be able to educate his family, to do his own thinking? Or is the tiller of the soil in the future America, going to sink back to the position which the tiller of the soil has almost without exception maintained in the history of the world, and from which he has emerged only occasionally, as for instance when he reached the American continent? This is the fundamental question, and my proposition is that the only way of assuring the permanence of the "American farmer" is that there shall be a union of all those people, and of all those agencies that can possibly be of any benefit to the farmer in a campaign for rural progress.

THE TORRENS SYSTEM OF LAND TRANSFER.

BY PROF. J. H. BREWSTER, ANN ARBOR.

It is generally well understood that the so-called "Torrens System" has to deal with the registration of title to, and transfer of land. As this system is suggested as a measure of reform, the question naturally occurs at the outset of any consideration of the subject: Why is any change in our present system thought to be necessary or desirable? It is only by bearing in mind certain prominent characteristics of our present system of recording deeds and transferring title to real estate, and by recognizing certain defects in this system, that the need or desirability of some change is apparent and that the advantages of the Torrens system of registration and transfer can be seen.

The great characteristic of our present system is that title to real estate passes, generally speaking, only by the execution and delivery of a deed of conveyance by the grantor to the grantee. This deed is then recorded at length in books kept in a public record office. In order to be recorded so that it may be notice to subsequent dealers in the land described in the deed, the deed must first be properly executed by the grantor and then it must be authenticated properly by some public officer —a notary public or justice of the peace, or other officer, who usually certifies that the deed was acknowledged before him by the grantor.

The general theory underlying such a system is that the records will show the title to the land described in these recorded conveyances. And the popular belief undoubtedly is that there is such a thing as showing by the records a good title.

But, assuming that the records are correctly made, that is that all conveyances are correctly transcribed from the originals into the public books, the fact is that there are so many things which seriously affect, or may affect, the title to land which the records do not and cannot show, that it is really impossible to show by the records alone a perfect title to land.

Many matters vitally affecting title cannot appear of record. For example, the fundamental fact of delivery of the deed, upon which the transfer of the title to the land described in it entirely depends, is not established by the fact that the deed is recorded. The record is, generally speaking, prima facie evidence of delivery, but the presumption of delivery arising from the record may always be rebutted, and in many cases expensive litigation has been necessary in order to establish this one fact of delivery—and often after such litigation the person supposing that he has title to land finds that in reality he has none, simply because there was no delivery (as the law understands it) of his deed in his chain of title.

Nor do the records show the genuineness of the signatures of either the grantor or the authenticating officer. A forged deed transfers no title even to an innocent purchaser; and forgery may, in law, be accomplished even when the signature to a deed is a genuine signature. For example, a prominent lawyer induced a client to sign a deed granting

land to the lawyer, under the belief that he (the client) was signing a duplicate lease. The lawyer then, on his apparent title to the land, borrowed $6,000, giving a mortgage to the money-lender, who relied on the record title but our supreme court held that the client's deed to his lawyer was a forgery, and that the lender must lose the money, or, at least, that the mortgage given by the lawyer could not stand as against the client.

So as to genuineness of the signature of the officer taking the acknowledgment—the records cannot establish this fact, and as there are thousands of officers who may act, it is, as a fact, an extremely difficult fact to establish. And yet, in Michigan, a deed of a married man does not convey his land free from his wife's dower interest unless she both executes and acknowledges the deed. A release of a mortgage appearing of record may not be a real release—and so a purchaser may buy land with a mortgage on it, when he thinks he is getting it unincumbered.

Neither a minor, nor a person of unsound mind, can convey good title to land owned by the minor or lunatic, and yet the records can not establish the fact of his capacity to convey. And if a young man of twenty should mortgage or deed his land, he may generally get it back even from an innocent subsequent purchaser years afterwards—in this state he has done so after ten years and when the land was in the hands of third persons who had relied on the records. And he need not either, in all cases repay the consideration money he has received—that is, he may spend the money and also get his land back. A person buying land must, therefore, either take the risk of the legal capacity to convey of those who have formerly owned the land, or he must investigate outside the records and ascertain at his peril that they have capacity.

In Michigan a man's homestead cannot be mortgaged or conveyed without his wife's signature—but, in the first place, no records in this State show whether the land is or is not a homestead, nor do the records show whether the man is married or single, nor whether, if some woman signs the deed with him, the woman is, or is not, his wife. Other matters concerning real estate depending on marriage or divorce are not shown by the records of deeds, and if any records show them they may be in an entirely different county from that in which conveyances relating to the land are recorded.

When a land owner dies no records establish satisfactorily and beyond doubt who his heirs are. A subsequent holder of the land must at his peril ascertain whether those claiming as heirs are really such, and, if they are, whether they are all the heirs.

The records show nothing as to title which may have been acquired by some one by adverse possession, nor do they show anything as to the many rights which may have been acquired by prescription.

Under our present system it is literally impossible for the most careful examiner of a title to be sure that his examination will show the true state of the title. Aside from this another objection to our present system in general is the accumulation of records. This is not in country districts as serious an evil as it is in cities, but in any locality it must, as time goes on, become a matter for grave consideration, whether it is really worth while to keep on copying at length and preserving at public expense all these records, which after all, do not, and cannot show the title to any piece of land.

But another difficulty is that no matter how often a title has been

examined, it must on each transfer by deed or each incumbrance by mortgage, be all re-examined again before any sale can be made or money borrowed—all of which means delay and expense, and it costs about as much to examine the title in this way for a small piece of land as for a large one—at least the proportion of expense is heavier and the delay about the same. Thus, this burden bears most heavily on the owners of small estates.

So far no mention has been made of mistakes which occur in transcribing the records—mistakes in names, descriptions of land, indexes, etc., etc. Our present system therefore provides simply for the registration of parts of the evidence of title, and actually perpetuates defects upon the records.

It is the peculiar characteristic of the "Torrens System" that it provides for the registration of titles—absolute and indefeasible. Its great leading features are that it clears titles, it registers titles, and it facilitates and cheapens transfers of titles.

The general method of procedure by which these ends are accomplished may be given in outline—and briefly. The first step is to secure the registration of title. If one wishes to have his land registered, he makes application to the proper court or officer and sets out in his application a description of the land and a statement of his title. There is then an official examination of the title and a notification is provided for adverse claimants and to all the world, by publication and other methods, that proceedings are pending for the registration of the title. If any adverse claims arise they are judicially determined and disposed of in court—and if no claims are asserted within a specified time, the title is duly registered in the name of the applicant in the county where the land lies. When the title is registered two certificates are made—one, the "original," being kept in the "Register of Titles," and the other, the "duplicate," being given to the owner. This certificate, based on the court's decree, shows that a certain person has a specified estate in a certain piece of land described in the certificate. After this, no transfer of title can be made, unless indorsed upon the original and the owner's certificates by the registrar. In case of a complete transfer of title, after registration, the old certificate is surrendered and canceled and a new certificate is issued to the purchaser—the new owner. In this way the material facts relating to the title appear upon the face of every certificate and no examination of title is required. The title is, so to speak, posted and a single page of the register shows its condition at any time.

After registration, no title to the land can be acquired by prescription or adverse possession. An owner of registered land may convey, mortgage, lease, or otherwise deal with his land, as freely as if it had not been registered; but no title passes until duly noted on the certificate of title by the recorder or assistant recorder. The owner's duplicate must be presented for notation of any change of title. If land is conveyed only in part, the old duplicate may be surrendered and canceled and replaced by new certificates to suit the case.

Deeds and other instruments affecting title amount under this system to contracts, simply. Title does not pass on the delivery of the deed, as now, but only when on the authority of the deed, the transfer is made on the register. The certificate of title is the muniment of title, and not the deed.

Upon the death of a registered owner, his lands may be registered by

the court in the name of his heirs or devisees—if he leaves a will—but the certificates shall show on their face the descent or devise—after final settlement of the estate and after the expiration of the time within which claims may be presented by creditors of the deceased, the heirs receive a certificate.

There is generally provided an assurance fund by requiring that on original registration, and on registration in favor of heirs or devisees, 10 per cent of the assessed value of the land shall be paid to the public treasurer. From this fund compensation is to be made to any one who, without negligence on his part, sustains loss or damage through fraud or negligence in the registration of the title. This indemnity fund is provided for in recogniton of the fact, taught by experience, that no system of registration has ever been devised in which there is not some liability to mistake, causing loss. As a fact, however, where the system has been in operation for years the calls made on this fund have been rare and insignificant. It does not follow from this feature that the Torrens System is a system of guaranteeing titles. Neither the state, nor anyone else, becomes guarantor of title to the holder of the certificate—he keeps the land simply because it passed to him by the entry on the register—and is therefore his land.

The Torrens is not a new and untried system. It has long been in use in certain parts of Europe—at least its fundamental principles have been there applied, in some places, for centuries. In Australia—whence we derived our useful ballot system, it has been in operation since 1858. In this country, Massachusetts, Illinois, Minnesota, California and Oregon have Torrens acts—though only in Massachusetts and Illinois have they been long enough on the statute books to have been given a trial. The accounts from Massachusetts—where there is a law better in some respects than that of Illinois—are most favorable. Objections which have been raised to the system on the grounds of unconstitutionality have been met and overcome in the Supreme Courts of Illinois, Massachusetts and Minnesota and it is now clear, from the interest taken in the matter in many other states, that before long statutes embodying the fundamental principles of the system will be adopted quite generally throughout the United States.

It is not claimed that the system is absolutely perfect—no humanly devised system can be—but that it has great advantages over our present system for the landowner, can hardly be denied by any unprejudiced and disinterested person who studies it.

THE INDETERMINATE SENTENCE FOR CRIME.

BY PROF. C. H. COOLEY, ANN ARBOR.

The people of Michigan have heard a great deal said this winter about the Indeterminate Sentence. It may be of interest to you if I discuss this matter briefly, attempting to show, first, just what indeterminate sentence is, and second, what are the principal reasons for and against its adoption by Michigan or any other American state.

The kind of sentence which we are all accustomed to in the working of our courts is the determinate sentence, that is, one whose length is fixed by the judge when a man is convicted, and cannot be changed afterward, except by the allowance of a certain amount of "good time" which a prisoner gets if he keeps the rules of the prison, or by pardon from the governor. In distinction from this an indeterminate sentence is one not fixed by the judge, but is left to be determined, within pretty wide limits, by the governing board of the prison to which the man is sent. The law at present fixes a maximum beyond which the sentence cannot be prolonged. Indeterminate sentence does not change this at all, but simply transfers to the prison board authority to determine the length of the sentence within the maximum limit.

It is understood that where indeterminate sentence is used the life in the prison shall be made, so far as practicable, educational, the prisoner having a chance to learn a trade and get other kinds of useful knowledge, the board judging of his fitness for release largely by his zeal and application in these studies.

It is commonly made to apply only to those who are comparatively young—say under thirty—and who have not previously been convicted of serious offence.

The most heinous crimes, like murder and rape, are usually excepted from its operation. In fact, if we would understand this matter, we must fix our minds not upon the most atrocious crimes—as people commonly do in considering questions of punishment—but upon the ordinary larcenies, burglaries and acts of violence, of which nine-tenths of the men who go to our prison are convicted. The atrocious crimes are so startling, appeal so urgently to the imagination, that we are likely to forget that they are comparatively few in number, and that the kind of crime which most concerns us, and which fills our jails and prisons, is a kind that results from bad training and bad associates, and does not imply any atrocious nature on the part of the offender.

So much for our definition. I will now try to give in brief the principal reasons for and against this way of dealing with the younger and less hardened class of offenders.

Perhaps the strongest of all arguments in its favor is the argument from experience, that it has been adopted with excellent results by a number of the more progressive states, among which are Massachusetts, New York, Ohio, Indiana and Illinois. Indeterminate sentence would have been practiced in Michigan since 1889, had not the law passed in

that year been declared unconstitutional by the supreme court, and by adopting a constitutional amendment permitting it, the people of the State have signified their wish to have this obstacle removed. It has, so far as I know, the unanimous approval of practical students of criminology, though many think that it cannot be made effective except in connection with radical changes in the methods of conducting our prisons, changes which shall make them, for the younger convicts at least, primarily educational and disciplinary.

The principles underlying indeterminate sentence are chiefly two: first, that the prison authorities have a better opportunity than the judge for close acquaintance with the prisoner, and hence are better qualified to determine how long he shall be confined. The judge sees the prisoner for only a few days, and that under very peculiar circumstances, namely while he is at the bar undergoing his trial. The length of the sentence he decides to inflict is, and must be, based on arbitrary and dubious grounds. The personal temperament of the judge and the way he happens to feel at the time of the trial are admitted to have a great deal to do with it. In fact the present system is no system at all, but leaves the sentence of criminals to the unconnected decisions of a dozen independent judges, each of whom is likely to have his own peculiar ideas and practices. The consequence is that no one principle is followed, and when two men meet at Jackson or Ionia, one of whom is sentenced for two years and the other for ten, there may be no reason whatever for the difference except the difference in severity between the judges.

A second reason for the indeterminate sentence is that the fixing of the term of confinement beforehand makes reformatory methods impossible. All plans of reforming young men in prison require that they shall be stimulated to exertion by the hope of release. If the time is fixed beforehand within pretty definite limits, the prison people have small hold upon their man. He has little to fear and little to hope, knowing that he will get out at a certain time in any case, and he is unlikely to do much more than merely observe the rules.

You may ask whether the parole system, under which the governor may release promising prisoners before their sentence is out, does not meet this need. The parole system is an excellent one so far as it goes, but it does not go far. Its main deficiency is that it gives no hold upon short-term prisoners. About two-thirds of the men sent to Ionia are committed for terms of two years or less, and, knowing that they are apt to get out so soon, have little hope from parole. Under indeterminate sentence they might be held for at least five years, if their progress was not satisfactory, and many of them for longer.

But are these young men capable of reformation? I can only say that it is the almost unanimous opinion of men of experience in prison work, that most of them are. At Ionia, for instance, four-fifths of those sentenced are under thirty. No very careful study of their previous history is made in this State; but where such a study is made it indicates that bad training is the main cause of criminality. At Elmira, N. Y., only fifteen per cent of those committed come from good homes, thirty-seven per cent, from those that are fair only, and forty-eight per cent from those that are bad.

I will now speak briefly of some of the commoner objections to indeterminate sentence.

It is said, first, that the worst prisoners are often the best behaved,

and so may cheat the authorities into giving them an early release. This indeed is possible; but the practical question is, which is most likely to be deceived, the judge, who gives a few hours to the case, or those who have a chance to observe the prisoner closely for months and years? Moreover, it must be remembered that, in a real reformatory, release does not depend upon mere observance of rules, but requires that a man show zeal and earnestness in self-improvement. It cannot be gained by merely negative qualities but demands active and persistent endeavor.

Another common objection, more or less definitely offered, is that indeterminate sentence lets the prisoner off too easily. This is simply a mistake. Under indeterminate sentence more is required of a man in the prison; he is kept there longer, on the average, and is held under control for some months after he gets out, being liable to be brought back if he does not conduct himself satisfactorily.

I find from the last report of our institution at Ionia that the average term of commitment, taking the first 158 names, is precisely two years. From this we must allow a considerable deduction for good time, and some perhaps, for parole. At Elmira, N. Y., where indeterminate sentence is practised, the average length of actual confinement appears to be about two and one-half years, and the men, when released, are kept under surveillance for six months more, and not infrequently brought back. The discipline also is regarded by the convicts themselves as more severe. They are not allowed to practice mere routine work but are required to exert their minds and show a real purpose to make better men of themselves. This is just what the young man who is capable of reform needs, and what the regular criminal hates. He does not want to study. He wants to serve out a short term in peace and go back to his old way of life.

Indeterminate sentence does not make it easier for criminals. What it does aim to do is to make a distinction between the young man who has made a bad start, but is capable of turning over a new leaf, and the hardened offender who will make no serious effort to become a good citizen. To the former it gives opportunity and encouragement. Upon the latter it may inflict the longest term of imprisonment that the law allows.

THURSDAY FORENOON.

The topics related to "Dairying" and Hon. Fred M. Warner, of Farmington, president of the State Dairymen's Association, occupied the chair. Papers were read upon "The Dairy Cow," "Building up the Dairy Herd," "Feeding and Care of the Dairy Herd," also on "Practical Suggestions Regarding the Real Property Law."

THE DAIRY COW.

BY PROF. C. S. PLUMB, COLUMBUS, OHIO.

The subject of "The Dairy Cow" allows a wide discussion, but it is my purpose to consider her from a rather limited point of view relative to certain phases of conformation and production. The importance of type in general has an application among cattle, and they have generally been arranged in recent years in three groups, according to their purpose. These are dairy, beef and general purpose. While it is true that there are exceptions to these types, in results produced, as a rule, a good dairy cow is lacking in beef producing capacity to a high degree. We of late have heard much of the general purpose or "dual" purpose animal, that is midway between dairy and beef type, which yields fairly well of both milk and beef. Hacker of the Minnesota Station and Beach of Connecticut have made careful studies of the relation of form to milk and fat production, and they have brought forward much evidence to show that animals angular, spare of flesh, deep bodied, wedge shaped, being more fully developed behind than in front, perhaps, with good udders made better and more profitable producers of milk and butter than beefy, thick-fleshed, block cows. In his experiments, Hacker, in 1895, tested 12 cows at the Minnesota station, that were divided into two groups, viz., angular and fleshy. The angular cows produced 6,720 pounds of milk per head, yielding 446 pounds of butter, giving a net profit of $38.11 each, while the fleshy cows produced 5,077 pounds of milk and 229 pounds of butter per head, giving a net profit of $10.37 a head. In 1896 this experiment was continued on 13 cows and while the results were not so wide in their difference, they were in favor of the dairy type.

Referring to this matter of type as affecting the dairy cow, in a copy of Hoard's Dairyman for February, this year, Mr. C. P. Goodrich gives a most interesting study of the dairy cattle of Fond du Lac county, Wisconsin. This deals with the herds of 48 patrons of creameries, including 637 cows. Special note is made in the report of the class and kind of cattle fed. The best record was made by a herd of 25 cows of dairy type, consisting of grade Guernseys and Jerseys. This herd averaged 5,809

pounds of milk, 298 pounds of butter per head, the cost of feed was $28.00 per head and the creamery returns were $57.18 per head. For $1.00 in feed $2.04 in butter was returned and a net profit per head was rendered of $29.18. In another herd, consisting of 10 grade Shorthorns, presumably of the beefy type, the cows averaged 3,626 pounds of milk and 152 pounds of butter, the feed cost $30.00 per head and the creamery returns were $28.57 a head. The records showed a loss of $1.43 per head.

While it does not follow that all beef cattle are unprofitable milk producers, as they are not, still, we have plenty of evidence to show that when type is taken into consideration the cow of dairy breeding and conformation far surpasses her beefy sister in producing the lacteal fluid.

If one wishes to know what a good dairy cow yields, there is no difficulty in producing interesting evidence showing dairy capacity of cows of different breeds. For that reason I desire to call your attention to what some cows have produced of either milk or butter, bearing on large dairy capacity. Taking a few representatives of the form dairy breeds, the following serve as illustrations:

LARGE MILK RECORDS.

Holstein-Friesians, yearly records.—Belle Sarcastic, owned by Michigan Agricultural College, 21,075.8 pounds; Aaggie, 18,004 5-16 pounds; Clothilde, 26,021⅛ pounds; Pieterje 2nd, 30,318½ pounds.

77 cows of this breed up to 1901 have produced from 15,000 to 30,000 pounds of milk in from ten months to one year's time.

Ayrshire, yearly records.—Alice Douglas, 12,617 pounds (official test); Rena Myrtle, 12,172 pounds.

47 cows of this breed show private yearly records of from 9,000 to 12,617 pounds of milk a year.

Jersey, yearly records.—Oneida, 12,734 pounds; Matilda 4th, 16,153 pounds; Kathletta's Fancy, 11,784 pounds, 2 ounces; Massena, 9,099 pounds, 6 ounces.

Guernsey, yearly records.—Lilyita, 12,812.73 pounds; Lily Alexandre, 12,856 pounds; Lily Ella, 12,282 pounds; Miss Bobolink, 12,437 pounds.

Up to 1903 sixteen Guernsey cows have records of from 10,000 to 12,856 pounds a year.

There are many high-class milk records for short periods, but the yearly records show the real milking capacity of the cow.

In this matter of capacity of the dairy cow, it will not be inappropriate to refer to the records of large butter production. The following are some of the records of prominence:

Holstein Friesian.—Belle Sarcastic, 136.88 pounds butter fat in six weeks; 3.26 pounds daily; 632.78 pounds fat in a year. Pauline Paul, 1,153 pounds, 15¾ ounces butter; Clothilde 2d, 30½ pounds butter in a week; Carlotta 2nd, 26 pounds butter in a week; DeKol 2nd, 33 pounds, 6 ounces butter in a week; DeVries, 30 pounds butter in a week.

Ayrshire.—Lady Fox, 624 pounds butter in a year; Rose Deross, 572 pounds butter in a year; Cad's Beauty, 96.66 pounds butter in 30 days, (an official record); Rena Myrtle, 546 pounds butter in a year, (official).

Jersey.—Landseer's Fancy, 936 pounds, 14¾ ounces butter in a year; Massena, 902 pounds, 3 ounces butter in a year; Signal's Lily Flagg,

1,047 pounds, 15¾ ounces butter in a year; Kathletta's Fancy, 678¾ pounds of butter in a year; Sophie Hudson, 716.89 pounds butter in a year.

Guernsey.—Lily Ella, 782.2 pounds fat, 912½ pounds butter in a year; Lilyita, 710.5 pounds fat, 828.9 pounds butter in a year.

By the 1902 Guernsey Breeders' Year Book, 172 tests are recorded of Guernsey cows making 400 pounds or more of butter in one year or less.

Whether these tests are all absolutely correct or not, the fact remains that they simply serve to show the capacity of the cow with the dairy lines and the more she deviates from this toward meat form, the more inconspicuous she becomes as a dairy producer.

If we leave the registered pure-bred cow of highest possibilities out of sight, then we still have evidence to show dairy capacity, in the records secured by Mr. Goodrich in the Fond du Lac cow census, published in Hoard's Dairyman this month of February and already referred to. In this case, 637 cows made 4,204 pounds of milk as an average yield per cow per year, with an average of 185 pounds of butter fat by Babcock test. Of course the better cows of the 637 ran in records far above these averages and they were cows of the better dairy type no doubt.

These figures only emphasize the necessity for the thoughtful dairyman to ever keep in mind high standards, which can only be obtained by the use of cattle of high dairy form.

This brings me to another consideration of the dairy cow, which is too often neglected and that is the udder and its conformation. If one may judge from what he sees in dairy herds, many men owning dairy cows give little or no attention to the udder, and its capacity. In coming up into Michigan yesterday I saw many specimens of so-called dairy cattle, which if they could have been presented before this audience, I am sure you would have wondered what possible use the owners could have had for them. Poor miserable creatures, starved, ill-formed and with wretched udders, they were a disgrace to this great agricultural State, with its many excellent herds.

The udder has received more or less attention, and still we know far too little about the process of milk secretion. (Illustrating on the blackboard before the audience, the lecturer sketched physiological features of the udder, and gave outline drawings showing different conformations.) The udder is a great gland suspended beneath the body of the cow and supported there by muscular attachments. There are two glands which lie side by side, like two beans with a muscle between, which extends up to the body and assists in holding these two glands in place. Each gland is independent of the other, but not only this, but each gland also is really in two parts, so that the udder is in quarters, with a teat connecting with each. Although each quarter is distinct, the separation is not plainly evident to the naked eye. At the Indiana Experiment Station, Dr. Bitting, the veterinarian, forced hot colored liquid tallow into the several quarters of the udder. When he forced red tallow in one quarter, and blue in the other, after these had solidified, and the udder was laid bare with the knife, a clear line of separation was always found between the red and blue color, even if on the same side of the udder. This explains why, if the cow gives bloody milk from one quarter, she need not give milk bad in character from the other quarter on the same side.

The interior of an udder somewhat resembles a sponge. Back in its

most solid parts, are small cells in which the process of milk secretion is going on. These cells are connected with groups of cells which have been likened to a bunch of grapes. From the cells the milk secreted passes off into small canals, and these into larger canals, until the milk finds itself in the large noticeable canals in the udder, which lead down to a cavity directly over the teat, known as the milk cistern. Each teat has a small muscle in it at the bottom, sufficiently strong to hold the milk back from escaping from the hole in the teat, unless force is used.

There are various forms of udders. Dairy cow experts of today generally concede that an udder which is quite round on the outside of the body from front to rear, with the teats well placed thereon represents a superior form. If, however, the udder is well extended along the belly, outside of the line of a circle that is regarded as even an improvement over the round outline. There are many udders, however, which have very defective points, the front teats being suspended high above the back ones, and the fore udder much abbreviated. Such a type of udder is not only lacking in beauty and symmetry, but it is also usually a poorer producer than one correctly developed in front. The hind udder is usually better formed, and is less a cause for complaint than the fore part. Again, some cows have very thin udders, viewed from in front or behind, and sometimes the udders are deeply grooved between the glands. These two features are also objectionable, and are indications of lacking capacity. The best udder should not only have a superior front and rear development, but it should be thick through, and not deeply grooved. Further, when milked out, it should be thin and mellow, shrinking readily in the hand, showing considerable milking capacity. The udder also should have the teats well placed on each quarter, of good size, so that they may be grasped comfortably by the hands. Teats about three inches long, standing straight down, and well separated, are about right.

While we have no figures on the subject, most persons who give consideration to this matter, prefer to have large, long, crooked milk veins extended along the belly of the cow and connected with the udder. These also should pass into the wall of the belly as it is termed, through good sized orifices or milk wells as they are usually known.

But comparatively little experimental work has been conducted showing the relationship of form of udder to capacity. It has been a subject of study on my part for some years, and not only have I conducted experiments in this field at the Indiana Agricultural Experiment Station, but also in several large dairy herds owned by private individuals. Briefly, I desire to call your attention to some of the facts obtained in these studies of the udder.

Comparing the capacity of fore and hind udder, a considerable number of cows were milked, the milk from the fore udder being weighed separate from that of the hind udder. In 113 milkings, the average yield from the fore udder was four pounds and one ounce of milk, while that from the hind part was four pounds and nine ounces.

Comparing fore and hind udder, where the fore udder was abbreviated and defective in conformation, thirteen cows were subjects of study. In these cases, the average yield for the fore udder was three pounds, nine ounces, while the hind udder yielded six pounds, one ounce. This gives striking evidence of the difference in capacity where one part of the udder is out of balance with the other.

Uniform udders were made a special subject of study, and nine cows were picked out where the front udder was so well developed, as to promise a good balance. In this class, involving eighteen milkings, the average yield for the fore udder was four pounds and nine ounces, while for the hind udder it was five pounds and one ounce, a very close relationship, in fact about as good as might be expected.

In comparing the right and left gland no material differences were secured. With five cows, covering three milkings, the average yield for the left side was three pounds, six ounces and for the right, one-half ounce more. It was thought as a result of this examination that the side milked first gave slightly the most yield.

These various matters pertaining to the dairy cow, have an important bearing on her development and the profits to be derived from her. If one will study his herd, and will constantly improve by casting out inferior, beefy types, and developing udders representing high capacity, then there is no reason why he should not pursue his business as a dairy farmer with increasing profit, pleasure and reputation. The expense is no greater, and the returns most certainly are justified in the increasing reward of income. There is also another reward, which always comes to the man who does his work well, that mental and moral satisfaction which comes to all men who contribute to the higher ideals of things in this world.

Q. Where can the details for a plank cattle barn be obtained?

Reply by Robert Gibbons: From John Shawver, Bellefontaine, Ohio.

Q. What proportion of cement should be used for horse and cow stable floor? Is Portland cement necessary or will Buffalo cement answer?

Reply. I used one part of cement to four of sand and was well pleased with the floor. Portland cement should be used.

Reply by A. M. Welch: I have used one part of cement to five of sand covered to a depth of one inch with a surface coat mixed one to two.

Q. Is shock corn a proper feed for dairy cows if you have no silo?

Reply by Prof. Plumb: While it can be fed to cows it is not a balanced ration and hence, is not economical unless something else is fed with it.

Q. What proportion of oats and peas do you sow to the acre and how do you sow it?

Reply: Several persons answered this question. Some of them use a bushel of each to the acre, others used two bushels of peas to one of oats, while still others used two bushels of oats to one of peas. One man sowed the oats first while another found it best to sow the peas before the oats were sown.

BUILDING UP THE DAIRY HERD.

BY HON. J. W. HELME, ADRIAN.

In the year 1893, being dissatisfied with fruit growing on my 40-acre farm in Adrian, I determined to change to dairying. Having no practical knowledge of expert dairying, my first step was to post myself and I subscribed for Hoard's Dairyman and other papers. After reading these I determined to have a thoroughbred herd of some dairy breed and upon the conclusion of the World's Fair test, I naturally selected the Jersey as my choice of breeds. I next subscribed for the Jersey Bulletin and bought all the Jersey literature I could get to post up on Jersey families. After considerable study I decided on the St. Lambert family and especially the Matilda branch of that family. Matilda 4th, who gave 16,000 pounds of milk in one year, was to my mind the greatest Jersey cow that ever lived. I had $500 to buy stock with and the question came up shall I buy ten "fair" cows and have my herd in operation at once, or shall I buy one or two extra cows and breed up? My cupidity said "buy ten;" my good judgment said "buy the best at any price." I finally purchased a grand-daughter of Matilda 4th, for which I paid $300, spot cash. She was in calf to the best bull living at that time, the sire of Ida Marigold who had just won a sweepstake at the World's Fair. She dropped me a bull calf, just what I wanted to head my new herd. Pretty big price you say. Well, she was the best investment I ever made. Last year at the age of 16 years, she dropped me a calf that I sold for $75, and gave me 7,000 pounds of milk, which sold in the form of cream for over $100, and she has been doing this for each of the nine years she had been with me. She was not a phenomenal milker but very persistent, hard to dry up, rugged and healthy. She had a pedigree in which every animal in my herd, twenty-five in number, are her daughters or grand-daughters and every one in milk will produce more milk and butter when mature than she.

Here is the first lesson in building up the herd. Like produces like, but more often the likeness of an ancestor. A calf from an extra fine grade cow may "take back" to a worthless ancestor. The foundation of a dairy herd should be a great performer with a pedigree full of great performers. Neither alone will do; we should have both. Thus the more star performers in the pedigree the less chance you have of drawing blanks in the offspring. I also bought another registered cow for $150. With these two cows I founded my herd, in March, 1894.

To review briefly, to start a dairy herd, first read the dairy papers and books; next select the breed you like best, for that is the one you will be the more liable to be successful with, but it should be a dairy breed, viz., Jersey, Guernsey, Holstein, or Ayrshire; avoid the beef breeds for the dairy and especially that mythical thing known as the "general purpose cow." A cow does one of two things with her feed—she either puts it upon her back or into the milk pail; she cannot do both. For foundation animals, get the best; the foundation cow should be a good

performer with a pedigree of good performers behind her. The sire should have a similar pedigree and a great mother behind him.

Now we have a start; the process of grading up is the work of years; however good the herd is there will always be a "poorest cow." A better one must be raised to take her place. Dairy calves should be raised on skim-milk, bran, clover hay and pasture, feeding liberally but not of any fattening food. Breed not younger than fifteen months and not older than twenty-one months, varying according to the size of the heifer. In my experience, the three months preceding the birth of the first calf is the time to make the cow. During these three months I feed all the grain they will eat up clean and plenty of roughage. The young heifer must at this time develop her calf, her udder, and keep up her own growth. Never does she need as liberal a feeding as at this period and as milk fever never occurs with first calf, there is no danger.

Having got the herd in milk, the next thing necessary is a pair of scales and a Babcock tester. Every cow's milk should be weighed night and morning and a record kept of the same. Get a spring balance that weighs 30 pounds, set back the dial the weight of the milk pail, make a blackboard at the barn ruled to accommodate a week's milk record. The milker has then only to hang his milk pail on the scales and record the result on the board; not two seconds of extra work. Each week remove the record to your dairy account book. You will be surprised how the cows will vary from your estimate of them. At the end of the year many a cow that required two pails to hold her milk when fresh, will be found behind her more modest sister who kept everlastingly at it. Now you can begin to cull; discard every cow that goes dry on her own motion; while every cow should be dry six or eight weeks previous to calving she should be forced to dry; she ought to be giving at least 16 pounds per day when you start in to dry her up. Discard the cow with short teats; she takes too much time to milk; likewise the cow with a dainty appetite. The profitable dairy cow should eat everything in sight. Every year select the two most promising heifers to bring up to take the place of the two poorest cows. Sires may be bred to their own daughters, but not to their grand-daughters. A change of sire is necessary at this time. Get the very best you can buy. Remember he is half the herd and if he is only common your herd will go backward instead of forward. Never breed to anything but a thoroughbred sire and, above all, don't cross breed. Think a minute of what you are doing by cross breeding. Here stands a Jersey; for seven centuries the farmers of Jersey Island have been breeding her to produce milk and butter. Think of it, seven centuries of brain and labor in that little animal to get the blood running to milk and butter. Here stands a Shorthorn, bred for a like period to produce beef. How thoughtless the farmer is who at one fell stroke destroys the work of seven centuries. How egotistical to think that one man in a year could improve the thought and labor of centuries. Select your dairy breed and stick to it. If you cannot afford thoroughbreds, then get grades of the same breed, but avoid scrubs and cross breeds. Feed grain every day in the year; the benefit will come not so much at once in extra milk as it will in the succeeding years from the extra condition of your cows and the effect on their offspring, which is your future herd.

I give in the following table the results of my herd for the calendar year 1902. No cow should be kept unless she gives 6,000 pounds of 5 per cent milk after her second calf. While I milked twelve animals during the year, three of them were only in the herd eight months, so my herd averaged eleven cows.

Name.	Pounds milk.	Babcock test.
First calf.		
Bina (eight months)	4,901	6 per cent.
Second calf.		
Elsie Williams	8,202	5 " "
Angela	6,630	5.4 " "
Bessie (eight months)	5,433	5.8 " "
Nan	5,644	5.2 " "
Third calf or over.		
Rose Edson	6,300	6 " "
Doris Dale	6,537	5 " "
Jenessie	7,671	5.2 " "
Ollie Fisk	6,814	6.2 " "
Edna (eight months)	4,954	5 " "
Scrubby (grade)	5,265	5 " "
Sixteen years old.		
Matilda	8,806	5 " "
	75,157	

Annual average per cow, 6,832 pounds; 5.4 per cent.

Each of the above cows were dry during the year from four to eight weeks. The above figures indicate a butter production of 4,600 pounds, or over 400 pounds per cow.

The milk of this herd is made into cream and the cream sold directly to the consumer in Adrian. Considerable skim milk is also sold at two cents per quart. The balance of the skim milk goes to feed the thoroughbred calves, all of which are sold for breeding purposes. Under such circumstances the returns are hardly a fair comparison for the average dairy herd. I give them for what they are worth. Cream and skim milk sold during the year, $1,350.00. Young stock sold, $325.00; making gross returns of over $150 per cow. These figures do not include milk and cream for a family of six, nor two quarts a day for the hired man, nor butter that we get from an occasional churning when the cream trade is dull, nor calves on hand during the year, nor milk for twelve cats. After looking over these results, I feel that my method of building up a dairy herd has been fairly successful.

THE FEEDING OF THE DAIRY COW.

BY COLON C. LILLIE, COOPERSVILLE.

(Abstract.)

No man can be a successful feeder of dairy cows until he not only understands the requirements of each animal, but until he is thoroughly informed regarding the nutritive qualities of the different kinds of feed available for the purpose. The character of the food furnished will depend also upon the condition of the animal. Thus, a growing animal should be fed differently from one that has reached its full development, the same as a working horse requires more and different food from one that is standing in the stable. Without a knowledge of the chemical composition of food, and the needs of the animal, it is impossible to feed economically, either from the standpoint of securing the best results from the animal or making an economical use of the food. After making a careful study of the subject and taking into account the fodder available upon the farm and the market price of grain, the following ration has been adopted: Forty pounds of corn ensilage, four pounds of dried beet pulp and two or three pounds of cotton seed meal with all the clover hay the animal will eat.

While Illinois and Iowa are everywhere endorsed as corn-growing states, the counties of southern Michigan are well adapted for the growing of this crop and in no way can it be handled easier or more economically than when stored in the silo, which makes it possible to store the corn without serious loss. The silo is of a special value in seasons when the weather is not favorable for the perfect ripening of the corn.

Even more than with most other animals care should be taken that the dairy cow is properly housed. While on the one hand, it is important to have the stables well ventilated, so as to keep the air pure, it is of almost equal importance that the dairy cow is carefully shielded from the storms of winter. No man can handle a dairy herd economically who turns the animals out on stormy days and allows them to shiver in the blast for several hours. Sunlight also is one of the best germicides and it is very important that the dairy barn should be well lighted.

Q. How do you tie your cows?

A. Mr. Lillie.—There are several ways about equally as good. I tie two together, with chains. This has its defects as all other systems have.

Q. How many pounds of milk does it take to make a pound of butter when the Babcock test shows three per cent of butter fat in the milk? Also when the test is four, five and six per cent?

Answer by J. W. Helme:

Twenty-seven pounds of three per cent milk will make one pound of butter.

Twenty-one and four tenths pounds of four per cent milk will make one pound of butter.

Seventeen and two tenths pounds of five per cent milk will make one pound of butter.

Fourteen and three tenths pounds of six per cent milk will make one pound of butter.

THURSDAY AFTERNOON.

Hon. I. H. Butterfield, of Pontiac, Secretary of the State Agricultural Society, occupied the chair. The papers presented related to stock feeding and included "Profitable Pork Production," "Feeding Beef Cattle," "Experiments in Sheep Feeding." During the latter part of the afternoon a joint session with the teachers' institute was held and, with President J. L. Snyder, of the Agricultural College in the chair, Hon. A. E. Palmer, of Kalkaska, delivered an address on the "Centralized School Question."

PROFITABLE PORK PRODUCTION.

BY PROF. C. S. PLUMB, OHIO STATE UNIVERSITY, COLUMBUS, OHIO.

In the central west the pig has proven himself an important factor in the livestock interests of the country. No class of animals produce so great a gain in live weight for a given amount of food consumed, as the pig. He is often referred to as the "mortgage lifter." His popularity is general, and anything which will add to our knowledge of profitable production, is listened to with interest by the institute audience. Swine may be considered from a wide point of view, but in its special application to the subject of profitable production, it is my desire to direct attention to three things, which in my judgment play a most important part in ultimate profits, viz.: (I) The type fed, (II) the method cared for and (III) the food used. Taking each subject up by itself, we will first consider:

I. *The type fed.*—During recent years we have heard much concerning the type and class of animals. We know that there is a type in the draft horse quite distinct from that of the light trotter, that beef cattle belong to one type and dairy cattle to another, and so among pigs, we have two quite well recognized types. The common breed of pig found in the United States and especially in the central west, may be designated as the *lard type.* He is of such ancestry that he rapidly fattens into a broad-backed, short-bodied, short-legged, short-

headed pig, with a thick layer of fat about his body. He weighs heavy, is slow of movement, often lacks in vigor and too often produces small litters. The *bacon hog* is the other type. This is a class common in Europe, and but little bred in America. It is relatively narrow of back, somewhat long of body, and should be fairly deep, and usually has a long leg and long nose. This type does not produce a thick external layer of fat, but rather, produces more lean meat intermingled with the fat, and also has much larger litters than the lard type. The bacon pig has never become really popular in America, for the reason that it will not mature so rapidly as the American breeds, neither will it produce so many pounds of meat from a given amount of food, as will the lard type. The bacon hog, however, has certain features which commend themselves to us, which it would be well to engraft in our native breeds and which will be referred to later.

In a consideration of profitable pork production, it is essential that the man keeping pigs, either as a breeder or feeder, take type into account. This has somewhat more application to the breeder and feeder combined, than to the feeder, for he, the former, is doing something towards forming the character of our future pig stocks. For this reason it is highly desirable to select with care, having in view a number of things which bear largely on final profit. Of these, I might lay emphasis on (a) hardiness, (b) prolificacy, (c) uniformity and (d) good feeders. Considering briefly these features, *hardiness* is important with all animals. The extra fat, thick-fleshed, thick-winded type of pig, is very apt to lack vigor, and will be subject to disease and trouble, where one of more vigor, activity, more lean meat and less thickness in lard, would withstand what the other could not endure. Constitution among breeding animals is of the greatest importance.

Prolificacy is also highly essential. The real profits on farm animals come from reproduction, the primary purpose of all living bodies. Take two sows, and if one farrows four pigs, and another eight, the latter stands a much better chance to pay the owner a profit than does the former. Our very fat types of pigs are getting too deficient in the ability to reproduce. The breeder should select brood sows with regard to the size of litter they are derived from and so develop a strain of effective breeding stock.

Uniformity is also an important factor in handling stock. The man who can market a bunch of pigs uniform in color, size and character, will be sure to receive a price better than would have been obtained from a mixed lot, both in color and quality. Each of these features have their influence, and while color is of least importance, buyers are influenced to some extent by fancy points such as color. A carload of handsome pigs, white or black, would bring a better figure than the two mixed together.

Good feeders are always shown in type. It is a bad policy to feed a lot of odds and ends, ranging from really desirable animals to runts, titmans and inferiors. One who studies type will soon be able to select desirable feeders, such as may be expected to render a good account of themselves. They should show capacity for growth, be alert, of uniform type, and such as the market recognizes as of the best sort. If one is buying, he does not want to get rough skins, coarse bone and rough hair, long legs and stock of the wasteful type in killing.

Passing from the subject of type, in profitable pork production, we must give suitable consideration to certain important features in the

II. *Method of being cared for.*—Sanitary conditions are most important in the care of our live stock. Every year, in the west, large numbers of pigs die of cholera, which is often caused by filth and improper conditions. The old-fashioned pig pen, small and filthy, is not fit for keeping pigs in. Pigs require space and room to go about in as well as cattle and sheep. Wet feet, cold and general dampness, let alone filth, promote disease. So the quarters for swine should be dry and roomy, with the sanitation good.

Some years ago I constructed a pig house and runs which in my opinion, are far superior to the ordinary accommodations furnished for swine. A building was constructed, in which were a number of pens, separated by a feeding alley. Each pen contained a feed trough, and each pen was connected directly with a long, yet good-sized lot outside the feed barn. In each lot was a small pig house in which the animals slept. For feeding, all the pigs had to go to the feeding barn. Here the grain was convenient, and labor was reduced to a minimum. The pigs came to be fed rather than having the feed carried to them. The sleeping houses were large enough to shelter four medium-sized pigs, and the houses were easily moved from one part of the lot to another, thus keeping the conditions clean about each house. The lots were kept in rye, alone, or other green stuff in summer, as circumstances made desirable. A more convenient and desirable method of caring for pigs I do not know of. The cost is not large. One may make a feeding building out of as cheap or as good material as he wishes. Such an arangement as this provides for healthy surroundings. The old-fashioned combined pig pen, where the animals eat and sleep is unhealthy. Therefore, it should be discarded for something more healthful as well as convenient. This, in fact, has a large bearing on the relative profits, for good health is a necessity if pork is to be profitably produced.

III. *The food used.*—Without much question, the average man thinks that the profit in feeding largely comes from the use of food. This, of course, is of very great importance, yet we all know full well, that we cannot make money on feeding sick pigs, nor those that are very distinctly poor feeders.

The question of food, however, is very important. Some foods give better results than others both in growth and profit, and some are much more available to the farmer or stockman, than others. The agricultural experiment stations of this country have conducted extensive feeding experiments on swine, to learn the influence on development, and many valuable facts have been secured, that should be made use of by feeders. Corn is largely used in the Mississippi valley, and is a cheap food in cost of production, while it is universally relished by swine. But it is not in some respects the best food, when used alone, that we can feed pigs, especially those of immaturity, and breeding animals.

Prof. Henry conducted some interesting experiments at the Wisconsin Station, showing very clearly the deficiency of corn as a food, for summer, when fed alone. He had three lots of pigs, of two in a lot. Each lot was fed corn meal as the only grain food, and salt and water. That was all lot one received. Lot two received in addition

to this hard wood ashes supplied in troughs. Lot three had bone meal mixed in the food in small amount. These pigs were fed 84 to 128 days, and then killed. The trial showed that none of the pigs were properly nourished. They did not differ much in general appearance, though these getting no ashes or bone were the most stunted. Slaughter, however, showed no difference in the proportion of fat to lean in either lot, neither was there any special difference in the intestines. When, however, the bones of the leg (thigh) of pigs in the different lots were broken in a testing machine in the laboratory, those fed the corn meal without ashes or bone, broke at 301 pounds pressure, while those fed bone meal required 680 pounds pressure. The lot fed ashes broke at 581 pounds. This experiment clearly sets forth the need of mineral matter in the food of pigs fed only corn, else the bones will be deficient in strength.

It has, however, been demonstrated in experimental feeding, that corn meal diet only, is not as profitable feeding for pigs, as when substances are combined with it to better balance the ration. Skim milk is common in many localities, and has been shown to be a valuable substance to mix with meal to produce a more efficient and profitable ration. As a result of experiments in many stations, skim milk has been shown to have a feeding value of from fifteen to thirty cents per hundred pounds. Recent experiments at the Arizona Station show that pigs fed ten quarts of skim milk to one part barley, made daily gains of 1.48 pounds, giving 27½ cents return for each 100 pounds of skim milk. Other pigs fed sixteen quarts of skim milk to one part alfalfa, made a daily gain of 1.32 pounds, giving a return of 28.4 cents per hundred pounds of milk.

It has been stated, that the results of nineteen experiments conducted by the Massachusetts State Experiment Station, show the following:

Pigs weighing 20 to 80 pounds should be fed two ounces corn to one quart skim milk.

Pigs weighing from 80 to 125 pounds should be fed four ounces corn to one quart skim milk.

Pigs weighing from 125 to 190 pounds should be fed six ounces corn to one quart skim milk.

A most satisfactory standard ration for a pig consists of one part corn meal and one part shorts or middlings. Bran is not fitted for young pigs, nor as a rule for pigs at all, for its chaffy character is apt to cause bowel trouble. Such a ration as this, produces high-class pork, and pigs fed on it will gain rapidly.

During the season of 1900-1901 I conducted an experiment at the Indiana Station to see if some material could not be added to corn meal that would improve its value as a feeding stuff. For this purpose, tankage, a product of the packing houses, a material rich in protein, was used. Sixteen pigs, were divided into four equal lots. One lot was given ten parts pure corn meal and one part tankage; one lot given five parts pure corn meal and one part tankage; one lot was fed pure corn meal only, while a fourth lot was fed ten parts of a mixture in equal proportions of corn meal and shorts, and one part tankage. These pigs were fed from November 21 to March 27. During this time the lot fed corn meal made by far the poorest growth gaining 341½ pounds, or 237½ pounds less than lot four fed corn meal and shorts and tankage, and 283 pounds less than the lot that received five parts corn

meal to one part tankage. Those receiving corn meal only after a time became fussy over their food and would not eat well and never looked as active and healthy as the other three lots. The profit on the corn fed lot was 98½ cents, while on the other three lots it ranged from $8.82 up to $10.85½. This experiment clearly showed the advantage and profit in feeding swine a well-balanced food, such as the system required, in order to make the most healthy and satisfactory growth.

During 1901-2 an experiment was conducted at the Indiana Station under my supervision, which showed something as to the relative values of condiments vs. no condiment for swine feeding. Eight sows were placed in two lots and each lot was fed a mixture of half shorts and half hominy feed. Lot one was also given stock food, while lot two was not. These pigs were fed 120 days, during which time lot one, fed condimental food, gained 682 pounds and lot two 689 pounds. The cost for each pound of gain for lot one was 3.0 cents and for lot two 2.6 cents. These pigs did well in each lot and were fed at a decided profit.

If one will have a standard, and breed and feed pigs of a definite type and high quality; if he will select pigs that will not only breed well but will feed well; if he will adopt wise precautions to maintain health conditions about his premises, and, finally, if he will study the principles of animal nutrition, and will feed in a sensible fashion, in accordance with our present knowledge of the influence of foods on the body, he should have no difficulty in handling swine, as breeder or feeder with profit.

BEEF PRODUCTS.

BY PROF. R. S. SHAW, AGRICULTURAL COLLEGE.

A review of the conditions which have surrounded the beef producer for the past year or two, considered in connection with those now existing, reveals a somewhat disparaging condition of affairs. The present feeding season was preceded by a scarcity of prime beef with all classes commanding a high price. In July, August, September, and part of October, 1902, top prices in the Chicago market ranged from $8.00 to $8.25 per cwt., live weight.

In the same year strictly hay-fed cattle brought fabulous prices. On April 14, 1902, a 13-car consignment of hay-fed range-fed steers from the Bitter Root Stock Farm, Hamilton, Montana, was sold at South Omaha for $6.15 per cwt. This shipment comprised 273 head averaging 1,308 pounds; finished on mixed timothy and clover pasture and hay. Similar sales of hay-fed stuff were also made on the Chicago market about the same time. Market conditions of 1902 are memorable because the price of meats went higher than at any time during twenty years. These high prices tended to stimulate the feeding business and also result in expensive feeder stocks during the latter part of 1902. During this season prime feeders could not be secured short of 5 cents,

with average grades at 4½ to 4¾ cents. As a consequence, the beef producer of the winter of 1902 and 1903 operated with high-priced feeders, high-priced feed and high-priced labor with the markets continuously on the decline; this decline did not begin until late in the fall after feeding operations had been planned or begun. It started down from between eight and nine cents, gradually falling to five cents within a period of six months. Under these conditions the beef producer could not realize a profit and did well if he came out even.

A question commonly asked is, what has caused the drop in beef prices? Though one should make a careful study of the economic and commercial features of beef production, markets, supply, demand, etc., still, it would not be possible to answer this question definitely as the influencing conditions are so numerous and greatly varied. Shortage in the supply was freely presented as the cause of high prices in 1902, and in truth the number of cattle per 1,000 people in the U. S. has been steadily diminishing since 1892. In 1892 the U. S. had 826 cattle per 1,000 inhabitants. In 1900 the U. S. had 585 cattle per 1,000 in habitants. This decrease, however, does not mean as much as it at first may appear to, for the export trade has nevertheless gone on increasing rapidly since 1894.

It is true that the supply had much to do with recent high prices simply because the cattle in the country in 1901 could not be fitted for market owing to scarcity of feed resulting from drought and the high prices of corn. As a result immense numbers were held over till 1902. The season of 1902 was universally productive of large crops; early frosts in the corn belt resulted in serious injury to the corn crop with the result that the only way to dispose of it profitably was by converting it into meat. Thus toward the close of 1902 feeders and feed were abundant.

In 1902 the high prices actually paid by the packers do not represent the comparative cost of the cattle. The receipts on the Chicago market during the first half of April, 1902, were only 94,200 as compared with 113,500 in the same period of 1901. In 1902 the cattle averaged but 975 pounds live weight, as against 1,042 pounds in 1901. Packers could not expect to get a corresponding amount of meat from a given number of head because of half-fat instead of finished stuff. For the poorer quality, they had to pay from $1.60 to $1.70 per cwt. more in 1902 than they paid for the better class in 1901. Though the extremely high prices were a boon to the producer, these could not be profitably maintained any length of time by the packer. We must therefore be content in future with more normal prices; it does not seem possible that fabulous prices can be attained and maintained in the near future.

The spasmodic marketing of cattle during the past six months has done much toward reducing beef prices so rapidly. This condition began to characterize the market late in October when on October 20, 1902. 30,843 head of cattle were placed on the Chicago market in one day. These rushes seemed to be due to lack of confidence in the maintenance of profitable prices for prime beef and as a result the unfinished stuff continued to flood the markets at intervals resulting in increased depression of prices and the holding over, as in one case, of 4,000 head in one day from one market alone. The producer would be much better off if some means could be devised to prevent the spasmodic marketing of unfinished cattle resulting in depressed prices.

The past year has witnessed an enormous marketing of calves. Unheard-of receipts of calves appeared on all markets in 1902, and, notwithstanding excessive numbers, continued to bring high prices. This situation was probably caused by skepticism regarding the stability of future values. The marvelous demand for veal throughout the year remains unexplained. It may be well for the beef producer to note that in the near future this may react beneficially on beef prices. Another noteworthy feature regarding the past two years' marketing is that large numbers of inferior grades have been worked off on the market and that there has been a great revival in improved methods of breeding.

There are some important facts which can be deducted in making a careful study of the market conditions of the past few years. Chief among these is the one that future market prices, so far as the producer is concerned, are largely a matter of speculation. Markets have their ups and downs. The reasons for these cannot always be foreseen by the producer even at the beginning of any feeding season. There is but one safeguard which the producer can build up around himself, viz.: The economic production of prime beef only by good methods of breeding and careful study of economy in feeding. The inability of beef producers to secure a profit or come out without loss, is likely to lead to undesirable results. The inducements of high priced beef during the middle of 1902, induced some local sheep feeders to take up cattle feeding in 1902 and 1903, only to meet with disappointment and loss. Now that prices are holding extremely high for mutton, there is strong probability that a return to normal or low prices in the mutton market will find a long line of producers holding costly stocks. While the few may make so-called "lucky hits" in shifting from one line of meat production to another, in general the practice is disastrous. It is this everlasting changing from one thing to another that has resulted in a lack of success among so many meat producers.

We firmly believe that in the future, Michigan will have to rely very largely on her own breeders for feeding stocks. Recently the practice of purchasing western stocks has developed to a large extent. Were this system to continue, it would lead to disparagement in breeding, but western stocks will probably not always be available for feeding in such large numbers as during the past few years. Michigan has not been developing its live stock industry in proportion to developments in other states of the Union. By the census of 1900, Michigan possessed 736,441 cattle other than milch cows, ranking 20th in this respect among the states of the Union. No factor has conducted to degrade the beef stocks of our country to such an extent as the interchange from the beef to the dairy business. There are just sufficient individuals making these interchanges with the ups and downs of the market, to produce the indiscriminate admixture of blood and type so disastrous to the beef producer. In this line of work, let us adhere tenaciously to specific fixed lines of production. The individual who can successfully and speedily adapt himself to radical changes is extremely rare.

As a part of successful beef production, make prime quality an essential feature. In the past, this term quality has been thought of most largely in relation to the differences as shown by animals possessed of varying degrees of good blood. In future we believe more

stress will be laid on the application of the term to the kind of carcass produced by the individual animal. To illustrate: It has been demonstrated of late that the scrub (lacking quality) can compete more closely with the beef steer (possessed of quality) in the production of quantity of meat from little quantities of food, than has been hitherto supposed. But because of the superior quality of the dressed carcass of the beef steer, the market still continues to discriminate in his favor to the extent of an increase in market value from $1.00 to $1.50 per cwt. live weight. In the past, quality and excessive fatness have been confused. A carcass possessed of quality must be thick-fleshed, juicy and tender, devoid of excessive fatness. Markets are demanding this class more and more. It began with discrimination against the heavy tallowy mutton, now it extends to the heavy overfat steer. How soon will the same application be made to swine?

Economic production of beef must depend largely upon three factors, viz., crop production, methods of feeding, and the amount and cost of the labor used. Cheap foods cannot be produced from poor lands poorly managed. The farm must be made to produce to its utmost capacity by proper rotating, careful fertilizing and skillful management of the labor applied. Having produced foods at the lowest cost, their economic use in feeding is the most important feature. The balanced ration is essential. It is unfortunate that computation of rations is not better understood, due to the terminology used in connection with the various food nutrients. The balanced ration simply means the supplying of foods in proper combination to meet the requirements of the animal without a deficiency or excess of any component. Many feeders through long years of experience, have learned to balance rations without knowing aught of the composition or digestibility of food stuffs. Such experience is often gained at great cost. Nature provides balanced rations for animal life as in the case of milk and grass. Many of the food stuffs have been specialized by the artifice of man for special purposes and in themselves are not perfect foods. In general, therefore, widely overbalanced rations must result in loss of those nutrients supplied in excess.

Economy regarding quality of concentrates used in beef making. This must depend, to some extent, on the nature and quality of the roughage supplied. In general practice, particularly in the corn belt, exceedingly heavy grain rations have been used for beef making. Notwithstanding the fact that the most rapid gains are generally the most profitable, nevertheless, the medium grain ration is proving to be the most economical. A heavy grain ration will produce absolutely greater increase in live weight than the medium, but the additional increase will not be in proportion to the increase in the ration. Where clover or alfalfa hay and corn silage comprise the roughage, from three-fourths pound to one and one-fourth pounds of concentrates per cwt. live weight per day, would illustrate what we mean by a medium ration.

Radical changes in the ration should be avoided. Losses may occur to a marked extent during the time required by an animal to adjust itself to the change. A variety of food stuffs, however, in the ration, is to be greatly commended, but even readjustment of these factors should be made slowly. Constant access to water is also a very important factor in beef production. This can best be provided where the animals are not confined in stalls. Recent investigations show

that while animals fed loose in sheds or yards consume a trifle more food, still the differences in results are not very marked. There is, however, a saving of one-half in favor of the loose feeding where labor is considered, as well as the advantage in the preservation and quality of the manure produced.

EXPERIMENTAL SHEEP FEEDING AT M. A. C.

BY W. P. SNYDER, (SPECIAL STUDENT) AGRICULTURAL COLLEGE.

The students at the Agricultural College have just finished an experiment in sheep feeding which has proven of much value to those interested in animal husbandry.

The College purchased a flock of Shropshire grade lambs for this test in the fall. These lambs were put under the care and management of three members of the senior class with the purpose of giving them practical work in feeding. It was a successful attempt to fix permanently in our minds the principles already learned in the class room. The plan was to let us conduct the feeding as we would for ourselves on the farm, with the aid of helpful suggestions given to us occasionally. Our purpose was to produce the best quality of mutton by feeding food that contained a high per cent of protein.

The lambs were divided into three lots of seventeen each almost equal in weight, and kept in pens side by side in a barn. Each of the students had charge of one lot. During the first eleven days the lambs gained at the rate of .27 pounds each per day, making 100 pounds increase at a cost of $3.40. Each lamb consumed daily on an average, 1.52 pounds of clover, .88 pounds of grain, .99 pounds of roots and 4.64 pounds or 4.5 pints of water. The roots were pulped and fed before the grain in the evening. Hay, grain and water were given to the lambs twice each day. We were careful to reduce the amount of feed on the warm days, as former experiments here have shown that sheep eat more and make better gains during cold weather. Care was also taken to give proper ventilation but we found that we could not always meet the sudden changes in the weather.

The experiment proper began on November 8, continuing till January 20, a period of seventy-three days. The ration of grain varied slightly but all contained a high percentage of protein, the average being two parts of corn, two of oats and one each of bran and oil meal. One lot were fed some barley with the other grains.

Each lamb, on an average, gained .29 pounds per day. This increase compares favorably with that of other experiments conducted under similar conditions, but the cost of production was too high for profitable returns under the usual market conditions, though, in this instance, the lambs netted a satisfactory profit, largely because of the superior quality of the mutton produced. The expensive production was due, not so much to the character of the grain fed, as to other factors. We put the lambs on a grain ration rapidly, with the intention of feeding

for only a short time. This did not give the lambs' systems sufficient time to adjust themselves to the changed conditions without a considerable waste of nutrients. Owing to the poor quality of the hay, the ration had to be largely grain. A pound increase is made at a much higher cost from grain than from hay. A pound of grain costs about five times as much as a pound of clover hay, while the nutrients of the two do not differ nearly so much.

No lamb was off feed during the period of 84 days. This, we believe was due to the effect of the mixed ration and the roots. Though a mixed grain ration, if properly balanced, may be more expensive than some one grain forming an unbalanced ration, the former may be the more profitable because it is consumed with less waste and tends to keep the animal in a healthier condition.

We kept water before the lambs all the time. They drank nearly as much between the night and morning feed as between the morning and night feeds. The lambs drank 4½ pints of water per head daily besides about 1½ pints of water in the roots eaten.

Forty-five of the lambs were slaughtered at the college by professional butchers. The students helped in the work. One carcass was cut up into the various cuts for retail sale. We were shown how to cut the carcass so as to get the most out of it. The value and use of each cut was explained. The weights of the live animals, carcasses and pelts were carefully kept. The lambs were dressed at different periods of time off feed to see what difference this would make on the percentage dressed. The results were as follows: Fifteen lambs slaughtered when six hours off feed dressed 53.78 per cent; six lambs slaughtered when twelve hours off feed dressed 52.8 per cent; twelve lambs slaughtered when eighteen hours off feed dressed 55.5 per cent; twelve lambs slaughtered when twenty-four hours off feed dressed 55.0 per cent.

These results were not quite what we had anticipated, but this seeming error showed us that we should not expect the results of any single test, with a few animals, to tally with the general rule. Individual characteristics vary greatly. One lamb dressed 59.9 per cent while another from the same lot and slaughtered under the same conditions dressed but 50 per cent.

The carcasses hung in a room without any heat until sold. Some remained on the hooks for two days without any appreciable loss in weight, while others lost .5 of a pound each day. The shrinkage on the forty-five carcasses averaged .4 per cent for each twenty-four hours they hung in the room. The shrinkage would have been greater, probably, if the temperature had not been so low that the carcasses froze.

These carcasses were sold to various meat dealers in the larger cities throughout the State. Each carcass was wrapped in paper and burlap and placed in a light crate. In every case, they arrived at their destination in most excellent condition and were awarded the top place in the market. Only words of commendation have been heard from those receiving them. We consider this experiment successful because we acquired the practical knowledge to be gained so well in no other way, and because we produced mutton of the best quality. We watched the fattening process from the pasture to the butcher's block. We made close comparisons of each lamb with its mates, and formed opinions as to how each lamb would feed. When we examined the carcasses, we knew how nearly correct had been our judgments. These object les-

sons fixed in our minds the facts learned from lectures and books. These were lessons that were practical, definite and clear. Our interest was aroused not only in this experiment, but also in the reports of the many similar tests conducted at other colleges throughout the country. In this way the practical and theoretical became so closely combined that, to the student, theory became practice in a real live sense.

The carcasses produced were of the most desirable character. The waste was reduced to a minimum. The flesh was evenly placed over the whole carcass. A large percentage of the meat was found on the most valuable cuts. The backs were thickly covered, the loins wide and thick and the "leg of mutton" full. The meat showed that beautiful mixture denoting tenderness and choice flavor. There were no loose bunches of tallow. The fat was intermixed with the lean, adding to the quality of both.

We fed a mixed protein ration to produce flesh rather than fat. We believe the results prove that our presumption was correct.

THE CENTRALIZED SCHOOL.

BY HON. A. E. PALMER, KALKASKA.

During the spring of 1902, Senator Palmer spent several weeks studying the results secured from the centralization of schools in northeastern Ohio and, although skeptical at first, he became fully convinced of its merits. He not only noted the results himself but was able to obtain the opinion of the patrons as well as the teachers and scholars and all were unanimous that better results were secured after the schools were centralized than under the old plan. Not only was better progress made by the scholars but the attendance was more regular and the cost was generally less. He spoke in part as follows:

"It is impossible to obtain results in a small school proportionate to the money expended. The rural school population is being moved to the villages and cities, there to get better education. Of the 65,000 schools in the State in 1901, over 1,000 had less than fifteen enrolled, and an average attendance of less than eight.

"Were these schools centralized, instead of scattered, the problem would be simpler, but they are scattered. A centralized school can be made with from two to ten districts. When two schools of twenty pupils each are close together it is better to unite them. There is an alarming dearth of efficient teachers in the State, especially in districts far from good training schools. Country school teachers are not well paid, but they get as much as you are able to pay. Our children in country schools are being taught in memorizing only. We need a longer school session in the country. The average is seven months of the year. The results of a short school year are not lasting. The pupils are leaving at an earlier age than they did ten years ago.

"When your children go into the village or city to get a higher education than the country school gives, although it is allowed to give it if

such a thing is possible, they are weaned away from the farm, and, besides, not all of us have the money to send our children to the village or city. I am here as an advocate of the centralized school system, which gives all, the rich and poor, an equal chance for education."

At the close of the afternoon session the following report was presented and unanimously adopted:

REPORT OF THE COMMITTEE ON RESOLUTIONS.

Resolved, That the forestry movement as represented and encouraged by the Michigan Forestry Commission, with its able auxiliaries, the State Agricultural College and the State University, has our unqualified approbation and support and we pledge our assistance in urging the members of the legislature from the localities we represent to support the measures recommended by the Forestry Commission. We also agree, in our local institutes, farmers' clubs and granges, to bring before the people the question of maintaining farm wood-lots and reforestation of their lands, utilizing such facts and figures as we can secure to make the discussions valuable and effective.

Resolved, That we commend and approve the proposed adoption of the Torrens system of transfers and registration of land titles and urge upon the legislature the passage at the present session of such legislation as will bring that system within reach of the property holders of the State, incorporating in the law the provisions which have been found in laws passed in other states to be economical and efficient in actual practice.

Resolved, That our interest in the Michigan State Agricultural College is unabated and that we pledge our devotion to continued agricultural education as exemplified at that institution and our support of all legitimate efforts to improve and extend the work of the college, particularly in relation to short courses and farmers' institutes.

Resolved, That we hereby express our thanks to the officers of the Shiawassee County Institute Society, to Mr. G. T. Campbell, Mr. James Osburn, Mr. A. S. Nichols and the members of the local committee of arrangements, to the State Superintendent of Institutes for the complete arrangements made for holding this Round-up Institute, for the valuable program and the courteous treatment given visitors.

We also tender our thanks to the choir and to soloists for the excellent music furnished for our entertainment during the sessions.

We also tender our thanks to the local press of Owosso and to the reporters and publishers of Detroit papers for the full and excellent reports made and published of the proceedings of this meeting.

I. H. BUTTERFIELD,
A. M. WELCH,
L. B. RICE,
Committee.

THURSDAY EVENING.

The meeting was called to order by Prof. J. W. Simmons, superintendent of the Owosso schools who introduced as chairman of the evening, Prof. Walter H. French, of Lansing, Deputy Superintendent of Public Instruction. The addresses were "Farming and Education," "The Preparation of Teachers for the Rural Schools," and "The Rural Schools as They are and as They Should be."

THE FARMER AND EDUCATION.

BY PRES. JAMES B. ANGELL, UNIVERSITY OF MICHIGAN.

(Abstract.)

Many persons profess to see a bottomless pit opening between the employing class and the laborer and we must look to the public schools to bridge the chasm. Our greatest danger is right there. If the time ever comes when the public schools are not opened as freely to the poor boy as to the rich man's son then God help us. Nothing can destroy society more effectually. When all the learning is with the rich and all the ignorance with the poor, may God help us. No boy with the right stuff in him need ever have the door of the university slammed in his face. Whenever a boy or girl wants an education, no matter what was the pursuit of the father, they should have as fair a chance as though they were children of a Standard Oil magnate.

The days when the three R education was sufficient in the rural districts are past. Today there are a certain few things which it is hoped education does for young people. It should awaken a pupil to the capacity which is in himself and it should make him well bottomed and free from one sidedness. The qualities of manliness and integrity should of course, come to all. The rural problem is the greatest problem before the Michigan people today. Today in rural schools we are not permitted enough teachers to teach other than the most common branches. In the central rural school the forces of the several district schools could be lumped and a better grade of teachers could be employed. I rejoice as much as anyone that Michigan has a college where the farm boy can get his technical education, but all boys will not return to the farm. They may wish to delve deeper into the realms of knowledge and enter fields of expert investigation. Hence, the necessity of the university. If there were no places to educate such men, we should soon reach the limit of knowledge.

THE PREPARATION OF TEACHERS FOR RURAL SCHOOLS.

BY PRES. J. L. SNYDER, AGRICULTURAL COLLEGE.

The rural school problem has received of late, thoughtful consideration not only by our prominent educators, but by the thinking citizens of our rural communities. Various phases of the problem have been presented and discussed at this meeting. The old district system which has rendered such valuable service in the past, seems to have outgrown its usefulness and must give way to something better. Why parley over "The little red school house." If, like the grist mill, the carding mills and the old postoffice it has fulfilled its mission, let it give way to a better system, one which will better meet the educational needs of the country children. While it is very important that we should have the best organization possible in order to carry on the administrative part of the educational work, yet we all recognize the fact that much more depends upon the teacher than upon the organization of the system. "As is the teacher so is the school." This old saying was never more true than it is today when applied to our rural schools. A thoroughly trained, wide-awake, energetic teacher will conduct a good school anywhere, while the poorly-trained, aimless sort of a teacher cannot do good work under the most favorable conditions. What our country schools need most of all is trained teachers. The teacher of the ungraded school, of all teachers, should have thorough preparation for work.

The teacher in the graded school can gain help from her principal or superintendent. There is always some one ready to point out her shortcomings and suggest their remedies. She gains help and instruction from her associates. The burden of maintaining discipline; except in her immediate presence, is borne largely by others. In times of perplexities and doubt, there is always some one to whom she can turn for advice; but the country teacher is shut off from the rest of the world. She must establish a miniature government in which she becomes the monarchial head. She must be wise enough to make, interpret and execute all the laws necessary for good, wholesome government. A little too much freedom and the young American will over-ride authority, but if the reins are too tightly drawn he will just as surely rebel. To govern wisely requires mature judgment, and not a little tact and self-control. The teacher of the ungraded school should be able to teach well all grades. She must be able to do a great deal of work in a small amount of time. She must work with freedom and dispatch, and must know her subjects well and the best methods of presenting instruction to her pupils. All these qualifications, and many more should she possess to handle successfully the little ungraded country school.

It is to be regretted that only a few of the teachers of our rural schools measure up to the qualifications just given. Many of them have had little education, if any, beyond the subjects they are actually required to teach. Immature in years, without special training for the work, and with no ambition nor expectation of following the work as a life calling, a large percentage of them fail entirely to meet the responsibilities which they

have assumed, and, as a result, bright children lose the only opportunity of their lives for gaining that inspiration and uplift which is the rightful inheritance of every pupil during the first few years of his high school life.

There are in the State about sixty-five hundred ungraded schools, and a little more than this number of graded schools. There are, all told, about fifteen thousand teachers, over four thousand of whom received last year the lowest grade certificate. The great majority of those holding third grade certificates are employed in our ungraded schools. The average service of the rural teacher is not over three years. This means that one-third of our country schools each year are in the hands of inexperienced teachers.

In a few minutes there will be thrown upon the screen pictures of dilapidated, unwholesome school buildings, and, while we shall look at them with a degree of abhorrence, yet we must not forget that the buildings of our rural schools, in most cases, will register a higher degree of efficiency than the teachers who occupy these buildings. Plans have been proposed and will be proposed for improving the buildings, but how shall we improve the teachers? Our normal schools, good as they are, are simply inadequate to train a sufficient number of teachers for our schools. Of the fifteen thousand teachers of the State, one-half hold certificates from our normal schools, and it is safe to say that nearly all this number are employed in graded schools. Very few normal school graduates are found in our rural communities. We certainly cannot depend upon our normal schools for the preparation of our country teachers. Some other method must be devised—a method which will train large numbers at comparatively little expense to the State, and also at a reasonable expense to those desiring to prepare to teach. This would imply that the training school must be brought to the young people rather than that they should travel long distances to such schools. The plan I would suggest is to establish as speedily as possible a training school in each county in connection with one of the better high schools.

We have in this State a most excellent group of high schools. In almost every county may be found a number offering four years of splendid work. One good school in each county could be selected and authorized to organize a department which would be known as a training department. Graduates of other high schools could be admitted to this department. No one should be admitted who was not a graduate of a high school. A course should be adopted of perhaps two years in length. Thorough instruction should be given in pedagogics and methods of instruction, and in addition, thorough instruction in nature study or elementary agriculture. This school should, of course, receive help from the State, depending somewhat in amount as to the course of instruction offered and the number of teachers employed. Each training school would be of such advantage to the city or village in which it was placed that much of the expenses would be gladly borne by said city. Each city has already the necessary organization to carry on the work. The superintendent of the city is an expert in pedagogics. The city schools serve as training schools for the pupils in preparing to teach. They would have every opportunity to gain knowledge at first hand as to the best methods of imparting instruction. Many of them could receive actual experience by substituting in the absence of regular teachers.

There should be a teacher in this training school who is thoroughly

prepared to teach nature study or elementary agriculture. A school garden should be maintained in connection with this school where the practical work could be carried on. This would bring those prepared to teach into sympathy with country life. They would bring to their work in after years knowledge and inspiration, which is now very rarely found. Nature study has been prated before the public for the last few years. Much has been claimed for it, but I think it is generally conceded that so far all efforts to introduce nature study into public school work have been failures. The reason for this is easily discovered. Like every other subject, those giving instruction on this line must have preparation. We might as well expect an instructor who had not learned the multiplication table to give instruction in arithmetic as to expect a teacher to instruct others in nature study who had not herself had thorough training in this line.

These schools should be able to turn out a class of teachers who would be able to show country children the beauties with which they are surrounded, and thus enable them to grow in sympathy more and more with country life. One such training school in a county with a two-year course should ordinarily have enrolled fifty students, twenty-five of whom would graduate each year. Fifty such schools would turn out over twelve hundred trained teachers each year for our rural schools. This is a large number but it is doubtful whether it would supply the demand. Fifteen hundred dollars from the State in addition to the part borne by the city would seem to be an adequate sum for carrying on the work of each school.

Even if fifty schools were established the expense to the State would not be greater than that now required to carry on a first class normal school. If our country schools are to do the work which will be demanded of them in the future, some such plan must be adopted. The time is fast approaching when the country boy and girl will demand as good instruction as that given to the city cousin. If the State can afford to establish normal schools to prepare teachers for our city schools, so can it afford to assist training schools for rural teachers. It is a right which belongs to the rural communities and they should no longer delay in making their needs known, and in applying for the help which this State has so generously given to other educational enterprises.

There is a bill before our legislature authorizing the establishment of a country training school somewhat along the lines indicated in this paper. It should receive the support of every farmers' organization, and every supporter of our rural schools.

In the past too many of our young people have left the farm home at the first opportunity because a higher life could be found in villages and cities. Many farmers have abandoned their homes and sought residence in the city because of better school facilities. With better trained teachers our country schools would render as high a degree of usefulness as our city schools, and would tend, more than any other one thing, to bring to our rural communities those educational advantages the lack of which in the past have been the most serious objection to country life.

RURAL SCHOOLS AS THEY ARE AND AS THEY SHOULD BE.

The closing address on Thursday evening was by Prof. Orville T. Bright, of Chicago, who gave an illustrated talk on "Rural Schools as They are and as They should be." He showed on the screen, views of tumbled-down school houses which seemed familiar to many of the audience. Many of them might be readily taken for woodsheds, as they were not only devoid of any architectural beauty but were poorly lighted and heated, and without means of ventilation. As a contrast, he showed a number of modern school houses that, although inexpensive in construction, were up-to-date in every respect. He laid particular stress upon the method of heating and ventilating the rooms and, while he favored the furnishing of all schools with a library, pictures and the making of them as homelike as possible, he ridiculed the charts and other "teacher's aids" that are worked off upon school officers by many of the supply houses.

TEACHERS' INSTITUTE.

The schools of Shiawassee county were closed on Thursday and Friday to enable the teachers to attend the institute. On Thursday afternoon and Friday forenoon they met as a separate section with Prof. O. L. Bristol, of Corunna, county commissioner of schools, in the chair, and joined the general institute for the latter part of Thursday afternoon and on Thursday evening. Friday afternoon was spent visiting the schools of Owosso. The appended papers were among those presented.

THE RURAL SCHOOL AND THE FARM COMMUNITY.

BY PRES. K. L. BUTTERFIELD, RHODE ISLAND AGRICULTURAL COLLEGE.

Among the great phenomena of our time is the growth of the school idea—the realization of the part that the school plays in our civilization and in the training of our youth for life. Without going into great detail, or trying to trace precisely the stages by which this school idea has made progress, we may say that there have been some five or six different reasons given by public opinion why the public school should exist. Our New England fathers started the school in order to teach

their children to read the Scriptures, that they might not get wrong ideas of their religious duty. Even after this idea was outgrown, our schools for generations did little more than to teach the use of the mere tools of knowledge; to read, to write and to cipher, were the great gains of the schoolroom. Even geography and grammar were rather late arrivals. Then came the idea that the school should train children for citizenship, and it was argued that the chief reason why schools should be supported at public expense was in order that good citizens should be trained there. History and civil government were put into the course in obedience to this theory. Another step was taken when physiology was added to the course, because it was an acknowledgment that the schools should do something to train youth in the individual art of living. Still another step was taken when manual training and domestic science were brought into our city schools, because these studies emphasize the fact that the schools must do something to train workers. And finally we have at present the idea gaining a strong foothold that the schools must train the child to fill its place in the world of men; to see all the relations of life; to be fitted to live in human society. This idea really embraces all the other ideas. It implies that the schools shall not only teach each individual the elements of knowledge, that they shall train for citizenship, that they shall train men in the art of living, that they shall aid in preparing for an occupation, but that they shall do *all* of these things; and do them not merely for the good of the individual, but for the good of society as a whole.

And not only is there a feeling that the pupil in school can be brought into closer touch with the life of the community, but that the school as an institution can be made more useful to the community as a whole. This double thought has been expressed in the phrase, "Make the school a social center." Of course, the word social in this sense does not mean that the school shall be made merely a place for carrying on the social amenities of life. The word "social" means that the school shall be a center for the community life, that here the community as a whole shall find leadership in organizing intellectual enterprises that promise to make the community better and richer.

The purpose of this paper is not to deal in the theory of the subject, not to argue particularly for this view of the function of the school, but rather to try to show some methods by which the rural school and the farm community can be brought into closer relations. In this way I hope to prove that there is a better chance for coöperation between the rural school and the farm community than we have been accustomed to believe, and that this closer relation is worth striving for. I shall suggest five methods by which the rural school can become a social center. Some of these have already been tried in rural communities; some of them have been tried in cities, and some of them, so far as I am aware, have not been tried at all.

1. The first means of making the rural school a social center is through the course of study. It is here that the introduction of nature study into our rural schools would be especially helpful. This nature study when properly followed approves itself both to educators and to farmers. To educators, because it means the use of environment in education. To farmers, because it means a better preparation for the business and life of the farm. I think it is a pedagogical principle recognized by every modern teacher that in education it is necessary to consider the environ-

ment of the child, so that the school may not be to him "a thing remote and foreign." The value of nature study is recognized not only in thus making possible an intelligent study of the child's environment, but in teaching a love of nature, in giving habits of correct observation, and in preparing for the more fruitful study of science in later years. Our best farmers are also coming to see that nature study in the rural schools is a necessity, because it will tend to a knowledge of the laws that govern agriculture, because it will teach the children to love the country, because it will show the possibilities of living an intellectual life upon the farm. Nature study, therefore, will have a very direct influence in bringing the child into close touch with the whole life of the farm community.

But it is not so much a matter of introducing new studies,—the old studies can be taught in such a way as to make them seem vital and human. Take for instance geography. It used to be approached from the standpoint of the solar system. It now begins with the school house and the pupils' homes, and works outward from the things that the child sees and knows to the things that it must imagine. History, writing, reading, the sciences, and even other subjects can be taught so as to connect them vitally and definitely with the life of the farm community. Let me quote Colonel Parker, who suggests the valuable results of such a method of teaching: "It would make a strong, binding union of the home and school, the farm methods and the school methods. It would bring the farm into the school and project the school into the farm. It would give parent and teacher one motive in the carrying out of which both could heartily join. The parent would appreciate and judge fairly the work of the school, the teacher would honor, dignify and elevate the work of the farm." The study of the landscape of the near-by country, the study of the streams, the study of the soils, studies that have to do with the location of homes, of villages, the study of the weather, of the common plants, of domestic animals,—all of these things will give the child a better start in education, a better comprehension of the life he is to live, a better idea of the business of farming, a better notion about the importance of agriculture, and will tend to better fit him for future life either on the farm or anywhere else, than could any amount of the old-fashioned book knowledge. Is it not a strange fact that so many farmers will decry book knowledge when applied to the business of farming, and at the same time set so much store by the book learning that is given in the common arithmetic, the old-fashioned reader, and the dry grammar of the typical school? Of course any one pleading for this sort of study in the rural schools must make it clear that the ordinary accomplishments of reading, writing and ciphering, are not to be neglected. As a matter of fact, pupils under this method can be just as well trained in these branches as under the old plan. The point I want to emphasize, however, is that a course of study constructed on this theory will tend to bring the school and the community closer together, will make the school of more use to the community, will give the community more interest in the school, while at the same time it will *better* prepare pupils to do their work in life.

2. A second means of making the rural school a social center is through the social activities of the pupils. This means that the pupils as a body can coöperate for certain purposes, and that this coöperation will not only secure some good results of an immediate character, results

that can be seen and appreciated by everyone, but that it will teach the spirit of coöperation. And, by the way, there is hardly anything more needed today in rural life than this spirit of coöperation. The schools can perform no better service than in training young people to work together for common ends. In this work such things as special day programs, as for Arbor Day, Washington's Birthday, Pioneer Day; the holding of various school exhibitions; the preparation of exhibits for county fairs, and similar endeavors are useful and are being carried out in most of our rural schools in this State. But the best example of this work that I know of is a plan that is being used in the state of Maine, and is performed through the agency of what is called a School Improvement League. The purposes of the league are 1, to improve school grounds and buildings; 2, to furnish suitable reading matter for pupils and people; 3, to provide works of art for schoolrooms. There are three kinds of leagues, the local leagues organized in each school; town leagues, whose membership consists of the officers of the local league; and a State league, whose members are delegates from the town leagues and members of the local leagues who hold school diplomas. Any pupil, teacher, school officer, or any other citizen may join the league on payment of the dues. The minimum dues are one cent a month for each pupil, for other members not less than ten cents a term. But these dues may be made larger by vote of the league. Each town league has a delegate to the meeting of the state league. Each league has the usual number of officers, elected for one term. These leagues have been in existence only about four years but they have already accomplished a great deal of good. They have induced school committees to name various rural schools for distinguished American citizens, as Washington, Lincoln, and so forth. They give exhibitions and entertainments for the purpose of raising funds. Sometimes they use funds to buy books for the schoolroom. These books are then loaned to the members of the league; at the end of the term this set of books is exchanged for another set of books from another school in the same township. In this way at a slight expense each school may have the use of a large number of books every year. The same thing is done with pictures and works of art, these being purchased and exchanged in the same way. Through the efforts of the league school houses have been improved, inside and out, and the school grounds improved. You will see that it is not so much the doing of new things that has been attempted by this league. The important thing is that the school has been organized for these definite purposes, and the work is carried on systematically from year to year. I believe it needs no argument to show the value of this sort of coöperation to the pupil, to the teacher, to the school, to the parents, and to the community as a whole.

3. A third method is through coöperation between the home and the school, between the teacher and pupils on one side, and parents and taxpayers on the other side. Parents sometimes complain that the average school is a sort of mill, or machine, into which their children are placed and turned out just so fast, and in just such condition, but if this is the case, it is partly the fault of the parents who do not keep in close enough touch with the work of the school. It is not that parents are not interested in their children, but it is rather that they look at the school as something separate from the ordinary affairs of life. Now, nothing can be more necessary than that this notion should be done away with. There must

be the closest coöperation between the home and school. How can this coöperation be brought about? Frequently parents are urged to visit the schools. This is all right and proper, but it is not enough. There must be a closer relation than this. The teacher must know more about the home life of her pupils, and the parents must know more about the whole purpose and spirit, as well as the method, of the school. I have no doubt that a great deal of good has been done by the joint meeting of teachers and school officers. It seems to me that this is a very wise device, and one that should be kept up. But so far as I can discover, altogether the most promising development along this line is the so called "Hesperia Movement," which originated in our own State, and the principle of which is in operation in a number of counties of Michigan and has spread to other states. The general plan, as you may already know, is to secure a meeting of the teachers of a county with the farmers. This meeting may be held once a year, as in Oceana county, where they have an annual meeting attended by thousands, and secure for the platform speakers of national reputation; or the meetings may be smaller and more frequent, as in Kent county, where they hold five or six meetings a year in different parts of the county. Usually there is a county organization formed which is called a Teachers and Patrons' Association, with regular officers. Sometimes these meetings are held under the auspices of the Grange. It doesn't matter so much how the work is organized so long as it is carried on with some degree of system and persistence. These programs take up the work of the school in a way that will interest both teachers and farmers. They bring the teachers and farmers into closer touch socially and intellectually. They disperse fogs of misunderstanding. They inspire to closer coöperation. They create mutual sympathy and understanding. And I cannot too heartily commend efforts along this line. They are sure to result in bringing the teacher into closer touch with community life and with the social problems of the farm. And they are almost equally sure to arouse the interest of the entire community, not only in the school as an institution and in the possibilities of the work it may do, but also in the work of that teacher who is for the time being serving a particular rural school.

4. A fourth method is by making the school house a meeting place for the community, more especially for the intellectual and aesthetic activities of the community. A good example of this kind of work is the John Spry School, of Chicago. In connection with this school there is a lecture course each winter; there is a musical society that meets every Thursday evening; there is a men's club that meets every two weeks to discuss municipal problems and the improvement of home conditions; there is a women's club to study for general improvement and social service; there is a mothers' council meeting every two weeks; there is a literary and dramatic society, meeting every week, composed of members of high school age, and studying Shakespeare particularly; there is a dressmaking and aid society, meeting two evenings a week, to study the cutting of patterns, garment making, etc.; a food study and cooking club, also meeting two evenings a week, an inventive and mechanical club, meeting two evenings a week, and tending to develop the inventive and mechanical genius of a group of young men; an art club; and a boys' club, with music, games, reading lessons, reading of books and magazines, and intended for boys of fourteen or fifteen years of age. You must understand that these things are all under the direction of the school,

that they are free, and they are intended to educate. And plans like these are growing in our cities. Other schools are doing something of this kind of work. A new school building in New York city, large enough to contain forty-eight rooms, is expressly designed for use to some extent as a neighborhood center. It includes an auditorium to hold twelve hundred people, so arranged that it can be used as an assembly hall for pupils, and also for the general public. There will be gymnasiums and these can be used both by pupils and by the general public. It will not be feasible for the rural school to carry out such a program as this, but I mention the plan to show the possibilities of this idea of making the school a community center. No doubt one of the advantages of the centralized rural school will be to give a central meeting place for the township, and to encourage work of the character that I have been describing. Of course, the Grange and farmers' clubs are doing much along these lines, but I still believe that it is possible for the district school also to do some useful work of this character. Singing schools and debating clubs were quite a common thing in the rural schools forty years ago, and there are many rural schools today right here in Michigan that are doing work of this very kind. I can see no reason for example why the country schoolhouse should not offer an evening school during a portion of the winter, where the older pupils who have left the regular work of the school can carry on studies, especially in agriculture and domestic science. There is need of this sort of thing, and I believe that if our Agricultural College and the Department of Public Instruction, and the county commissioners of schools, and the county teachers, and the farmers themselves, could come a little closer together on these questions the thing could be done.

5. Fifth and last, I would suggest as a method for making the school a social center, that the teacher herself shall become something of a leader in the farm community. The teacher ought to be not only a teacher of the pupils, but in some sense a teacher of the community. Is there not need that some one should take the lead in inspiring every one in the community to read better books, to buy better pictures, to take more interest in the things that make for culture and progress? I am aware that there are special difficulties in a country community. I know that the rural teacher is usually a transient; that she gets a city school as soon as she can; that she is often poorly paid; that she is sometimes inexperienced; that frequently the labor of the school absorbs all her time and energy. I am fully aware that these things are so, but I am also fully aware that they ought not to be so. And I don't believe that we shall ever have the ideal rural school until we have conditions favorable to the kind of work I am speaking of. I think that the country teacher ought to understand the country community, ought to have some knowledge of the problems that farmers have to face, ought to have some appreciation of the peculiar conditions of farm life. If I had my way, I would require every teacher to have some knowledge of rural sociology. And what do I mean by rural sociology? Let me just suggest the lines of work that were taken up this last semester in the University of Michigan in a course of this character, one of the first in the country. We studied first something about the business of farming, its importance as an industry, its relation to other industries, the extent to which it is progressing, the regions of country in which it is most flourishing. We took up the movement of population from the farms to the cities, and

tried to show the causes and results of this movement. We studied the social conditions of farmers, whether there was more illiteracy in the country than in the city, whether there was more crime in the country than in the city, whether there was more insanity among farmers than among other people, and so forth. Then we studied the things that are making for rural progress, such as good roads, free rural mail delivery, electric lines, rural telephone, the rural school, agricultural colleges, farmers' institutes, the experiment station, the department of agriculture, the Grange, farmers' clubs, country church, and so on. Now, I believe that these things are things that the country teacher ought to know about, and I believe that every country teacher should be expected to know about them, and that normal schools, teachers' institutes, and teachers' reading circles, should in some way provide this sort of thing. To my mind this is one of the most important means of bringing the rural school into closer touch with the farm community. I want at this point to quote something written some six years ago, by Henry Sabin, of Iowa, one of the keenest students of the rural school problem. He was speaking particularly of the supervision of country schools, and he said: "The supervisor of rural schools should be acquainted with the material resources of his district. He should know not only what constitutes good farming, but the prevailing industry of the region should be so familiar to him that he can converse intelligently with the inhabitants, and convince them that he knows something besides books. The object is not alone to gain influence over them, but to bring the school into touch with the home life of the community about. It is not to invite the farmer to the school, but to take the school to the farm, and to show the pupils that here before their eyes are the foundations upon which have been built the great natural sciences. Farmers also should study rural sociology, including the school question."

Let me now recapitulate: In order to make the rural school a center for community life, I would first enrich the course of study; second, encourage the coöperation of pupils, especially for the improvement of the school and its surroundings; third, bring together for discussion and acquaintance the teachers and the patrons of the school; fourth, so far as possible make the schoolhouse a meeting place for the community, for young people as well as for older people, where music, art, social culture, literature, study of farming, and in fact, anything that has to do with genuine rural progress may be fostered; and fifth, through the knowledge by the teacher of the industrial and general social conditions of agriculture, and especially of the community in which her lot is cast.

Of course, all this plan is not possible at once. But it shows that something can be done, for something has been done, and it indicates what I believe to be a broad general plan which is practicable and useful.

And in closing, may I not ask, does not all this appeal to you as eminently sensible and reasonable? Would it not tend to improve the rural school and at the same time to better the farm community? In any event, I believe it is the direction in which we shall see great progress during the next ten or fifteen years, and I trust the teachers and farmers of this State will seek to place themselves in line for this forward movement in rural education.

THE RURAL SCHOOL PROBLEM.

BY PRES. J. L. SNYDER, AGRICULTURAL COLLEGE.

Great as has been the progress in all lines of industry during the last half century, the development in our educational system has fully maintained its place in the onward march. The graded school, high schools and technical schools are almost entirely the work of the last half century. Colleges and universities have increased a hundred fold in number. Their courses of study have been broadened and strengthened and their equipment so enlarged and changed as to render them unrecognizable by the student of fifty years ago.

Methods of instruction are no longer questions of fact or fancies, but are founded upon the science of the mind. Much, of course, is yet to be gained in this direction but already the progress borders on the miraculous. A city child may now enter the kindergarten at four or five years of age and pass step by step through the primary, the grammar and high school grades receiving in all from twelve to fifteen years of thorough careful instruction at public expense, but this is not all. He can enter one of the higher institutions of learning and spend from four to ten years more in general culture and in preparation for professional life. Thus, to the city child broad is the gate and wide the way which leads to education.

But children do not all live in cities. About half the children of Michigan live in the country. To the country child the opportunities for securing an education in public schools are not very much better, unless he have means to seek a school away from home, than they were several decades ago. In many respects the rural school has deteriorated in recent years. Better methods are used in teaching primary work, but the instruction now stops with the eighth grade, whereas a few years ago in many of the country schools algebra, geometry, and other high school subjects were taught. Better wages were offered and older and stronger teachers were secured.

It has been a comparatively easy matter to establish high schools in our cities and larger villages, but the country high school problem remains unsolved. If the country child is bright and willing and the parents ambitious and thrifty a way will be found. But the thrifty parents are not always ambitious to educate their children and the parents who appreciate the advantage of an education do not always, nor even often, have the income to gratify their desires. There are just as many children in the country who would take advantage of a high school if it were near at hand, as there are of our city children who do so. Indeed it might be reasonably expected that even a larger percentage of country children would attend high school than city children as inducements to labor to help support the family are not so great in the country as in the city. Country people appreciate to just as large a degree as city people the benefits of a high school training. Last year the citizens in our rural communities paid as tuition to our high schools over eighty-eight thousand dollars. There were enrolled in the high schools of the

State foreign students, which in nearly all cases were country boys and girls, over nine thousand pupils. These children paid as tuition from twenty-five to fifty dollars. They were in nearly all cases at the expense of either paying board or keeping a horse and buggy to transport them to the school. This expense varies from seventy-five to one hundred dollars for each student. All told it is not extravagant to say that the country people of Michigan paid last year one million dollars in their efforts to procure high school education for their children. This need not be regretted for it was money well spent. But we know that in every community where there is one parent who can spend a hundred dollars to send his children to the high school, there are five others who cannot, and it is safe to say that, if high schools were free to the country children as are our graded schools, from five to ten times the number would secure high schooling that are now able to take advantage of the opportunities offered. How many children near Detroit would take advantage of the high school if it were not for the fifty dollars tuition charged? There is a farmer living just outside the corporation of Kalamazoo whose four children have completed the eighth grade but he cannot afford to pay forty dollars tuition for each in order to send them to the Kalamazoo high school. There are thousands of such cases in the State.

A few states have tried the plan of paying tuition of students who have completed the eighth grade and who are ambitious to attend a high school outside of their own district. This makes it somewhat easier for children to receive high school training but does not solve the problem. The mere tuition is only part of the expense incurred by children who must go away from home to school, and while such a plan would enable a few to receive high school training who would not otherwise be able to do so, yet it would not make it possible for the great body of country children to secure high school education. It will not be possible to educate the children of our rural communities in our present city high schools. The high schools must be brought to the country, the country cannot be taken to the city.

Under present conditions young people living in the country, if they attend high school, must either drive anywhere from one to twenty miles each morning and evening, or live during the week in the village or city in which the high school is located. To drive every school day of the year in all kinds of weather and all conditions of roads is enough to try the strength of the strongest. It is a severe strain on strong boys and scarcely possible for girls. But even more objectionable is the plan of allowing these young people to remain in the city away from parental restraint during the week. Very few parents will ever think of doing so unless they have a near relative to whom they can entrust their children.

The great body of children cannot pay tuition and transport themselves to these high schools. Not only the schools, but transportation as well must be furnished. Of all the plans proposed it seems to me that the only feasible one for establishing good high schools in rural districts is found in the centralization idea. With this system all the children of one township, or of a certain number of districts, are gathered into one school. Wagons call at each house in the morning and convey the children to school and bring them home again when school closes for the day. The expenses of transportation are borne by the district. The plan is in operation in a few counties in each of eight-

een different states and seems to be meeting with splendid success. In connection with this school is established a high school. This enables all country children to have the advantage of from two to four years of high school training. These high schools are necessarily small. Such a variety of courses of study as are now offered in our large cities is not possible, nor in my judgment, desirable. These young people should be educated for rural life. This idea should not be lost sight of, while the primary object of course should be to make strong, liberal-minded men and women, who should be so trained as to be in touch with their environments and ready and willing to enter upon the every day duties of life when their school days are over. Efforts of course should be made to stimulate pupils to secure further education after completing the high school course, but it should not be a function of these high schools to educate pupils away from the farm and country life. The training should be toward the farm and not away from it. There is no place where brains and education count for more than right in the country. As district high schools will necessarily be limited to teaching force and apparatus it would be much better to give one course well than to offer several courses and give thorough instruction in none. In order to be of the greatest good to the greatest number I believe they should be industrial in character, giving as much science as possible and its application to practical affairs of rural and home life. Those of us who are not engaged in public school work do not perhaps grasp the importance of the rural high school or the number of bright boys and girls that could be reached if these schools were established throughout the State. It is often said and quite truly too, that the majority of our strong men come from the farm; but while one strong man may emerge from the great crowd, many others are not heard of simply because they do not know, and their parents do not know, the value of education. Many others who do not know and who would willingly avail themselves of such opportunities do not have the means under present conditions to give their children a chance. There are in this State 6,525 ungraded schools. The number of pupils of school age in these districts is 308,642, or an average of 45 pupils for each district school. Suppose that centralization was carried out and that ten sub-districts were united in one central school. This would mean a school of eleven rooms, forty pupils for each room, and in the State there would be 650 of these schools. But it may be said, and truly too, that all the children of school age do not attend school. Statistics show that in the district schools of this State there is an actual enrollment of 214,000 children, or an average of thirty-three children for each district school. If these were gathered into central schools, ten districts in each school, we would have 650 schools with eight rooms each, and an average of forty pupils in each room. But the question might be asked, "How many of these pupils would be prepared for high school work?" Taking at random a number of high schools in the State having about the same enrollment that each of these central schools would have we find that about sixty pupils in the school are enrolled in the high school department.

If country children would avail themselves of high school advantages, as do city children, we would have 650 of these high schools with an average of 60 pupils in each. Can you imagine what this would do for the rural population of Michigan? The time is approaching rapidly when some plan, either this one or some other one equally as radical,

must be adopted. The telephone, free mail delivery and the electric car has brought the country districts into touch with the higher life and they are now demanding, and will continue to demand, just as good edutional advantages for their children as are given to the inhabitants of the cities. The time is coming when an educated man can live and grow and enjoy life in the country. This has not been true in the past and, as a result, those who sought the higher life and more education for their children have been compelled to leave their farms and move to the cities. But with the other advantages now offered to the country people they still demand that the school must come to them. These high schools will mean much to the great industry of farming. Science has done much for this industry within the last few years. It was thought at one time that the man who could make two blades of grass grow where one had grown before was a great benefactor, a hero, but with the aid of science he will make not only two, but a dozen,—yes, a hundred.—grow where one grew before. One man by careful experiment, or by chance, will discover the seedless orange, and from this one tree will millions more be produced and the whole world made happier. With an educated class of farmers, such as these high schools in time would produce, production would more than be doubled and our land would be covered with beautiful and happy homes. The bright boys would not all leave the farm. The standard of intelligence would be raised, above all, opportunities would be opened to every one of ability and courage to reach the high plane in this life to which his energy and his ability entitle him; opportunity would be the same for the young people of the State without regard to location.

Just what plans should be adopted I am not here to say. It is a question that should receive the careful consideration of thoughtful educators. The country high school problem must be solved and, when it is settled, it is to be hoped that it will be settled in such a way as to commend itself to future generations.

THE SCHOOLROOM.

BY PROF. W. H. FRENCH, DEPUTY SUPERINTENDENT OF PUBLIC INSTRUCTION.

As a result of the study of the best means and methods of education we are coming to appreciate the necessity of better school architecture and schoolroom decorations. We understand that the aesthetic sense of the child must be trained in order that he may appreciate to its fullest extent the harmony and beauty of the world about him. Someone has said, "When the beauty of the world has entered into our souls, the beauty within will manifest itself in beautiful deeds." And another has said that, "The right picture on the wall of the boy's room may do more for him than a college education."

In considering the matter of school architecture we must consider first the order, symmetry, and beauty of nature. Colors that harmonize should be used for both exterior and interior of a building. The school grounds should be laid out with regard to beauty of landscape, as well

as to proper use by the children. For the exterior of buildings, if frame, we may have white trimmed with green, buff trimmed with terra cotta, dark red trimmed with brown, and so on. The woodwork of brick buildings should be painted to harmonize with the brick, either by analogy or contrast.

Ornamental trees should be found on every school ground. Flower plots tastefully arranged add to the effect and beauty of the grounds. All of these things should receive due consideration at the hands of the people and boards of education.

The modern schoolroom is a workshop and should be conveniently arranged. The library, apparatus, and cloak room should be arranged in the most convenient places, and it should be remembered that it requires thought and plan to do this work properly, because these things do not come by accident.

The woodwork should have a rub finish. There should be no shiny surfaces or varnished surfaces in the schoolroom. The best light for the schoolroom is from the north and east, or from the north and west. The house should face the south, if possible. The floor should be the darkest surface and the ceiling the lightest.

In rooms lighted as mentioned above the following tints may be used for the walls: orange yellow, olive green, gray, buff, and the ceiling should be a light tint of the same color. Rooms having principally a northern light should be tinted with warm colors, that is, with cream or orange yellow. With stronger light, we may use the other colors mentioned. The tints of red, blue and violet should be excluded from the schoolroom, as they are extremely trying to the eyes. The colors in hallways should be rich and strong and not delicate. Oil colors are the best. On the wall, about twenty-four inches from the ceiling, where the color begins to shade off into the lighter tint, there should be a molding upon which pictures may be hung, and this molding should be tinted to harmonize by contrast with the walls. Tints of cream and buff harmonize well with oak or Norway pine finish. The shades should be usually of the same color as the wall but slightly darker and should draw up from the bottom instead of let down from the top.

After the walls have been properly tinted, the decorations by means of pictures and furniture can be arranged. The national flag should never be used as a wall decoration. First, because it is very difficult to secure other furnishings to harmonize with it, either by analogy or contrast, and second, it is the sacred emblem of our country and should be displayed from the flag staff rather than from the wall.

In the hanging of pictures we should consider spaces, that is, place large pictures in large spaces, and so on, and if possible they should be hung on a level with the eye of the observer. The best decorations and the best pictures should be in front of the pupils, and pictures should be adapted to the ages of the children. On the walls of rural schools should be found pictures that appeal to the young children and those of intermediate grades and to mature pupils, in order that all may be touched by the unconscious influence which the pictures bring into the schoolroom.

In purchasing pictures we should secure the best. No cheap chromos, portraits or colored landscapes should be used. Lithographs, if excellent, photogravures and photographs are the best. Copies of famous paintings can now be purchased at so small a figure that no school dis-

trict can afford to be without them. In framing pictures for the schoolroom it is best to use a flat, smooth frame, of a color to harmonize with the picture. If a mat is used, it should not be conspicuous, that is, the color of the mat should be such as to throw out or bring out the picture, rather than hide it, and when the eye turns to the picture it should note the picture first and not the mat or the frame. Great care should be taken in hanging pictures so that they shall receive proper light in order to get the best effect.

There is a strong movement to place in the modern schoolroom copies of the best works of sculpture and this movement will certainly produce the highest results. Casts are made, first, "in the round," that is, the whole figure or bust, or, second, "in relief," that is, raised from a smooth surface. In placing casts in a room the greatest care is necessary in order that the light shall produce proper effects.

Teachers must take the initiative in all this work, because they are in constant touch with the school, and I would say to teachers, "Make a bold beginning, believing in your ultimate success in securing what you want."

The question may be asked "Why all this care and arrangement?" I would say, first, because it makes the work of the schoolroom easier. Nature loves harmony. Though the child may be unconscious of it, his nature constantly reaches out to the beautiful, and if his surroundings harmonize and if there is beauty in decoration and arrangement it will soothe his nerves and elevate his thoughts. Order, symmetry, and purity will result in his life. Second, it will produce optimistic ideas and cultivate ideals. In other words, it will produce real soul culture, which is one of the greatest necessities in the modern schoolroom. The unconscious influence of the child's surroundings either makes or mars his life for all time to come. Unconscious tuition is one of the greatest factors in education and with the ideal teacher and ideal surroundings we may expect that the child will approximate the ideal in his life.

THE WOMEN'S CONGRESS.

On the afternoons of Tuesday and Wednesday, special sections for the women were held. Mrs. E. J. Cook of Owosso, presided and the following papers were presented:

WHAT DO WE WORK FOR?

BY MISS JENNIE BUELL, ANN ARBOR.

If one above another has the right to speak with authority of work it is our president, Theodore Roosevelt, and he has by his own words and works made the strenuous life a synonym for noble living. Of the results he says: "If your heart is in what you have to do, no matter how small the undertaking, the greater things are sure to come to you and in rich reward." Emerson voiced the same sentiment: "If you love or serve, you cannot, by any hiding or stratagem, escape the remuneration." And again our Michigan farmer poet, Hathaway, said: "Do thou thy work, and trust thou God's decree, that as thy work thy recompense shall be."

This thought so variously expressed by these three great men, had a striking illustration in the early experience of that other great man, of the colored race, Booker T. Washington, whose college examination, as he says, consisted in sweeping and dusting a room.

This is what Elbert Hubbard would call "a man who could carry a message to Garcia." Mr. Hubbard's pen seldom stops short of the quick of his subject and he makes this instance the basis of some of the most incisive sentences he has ever written: "It is not book learning young men need, nor instruction about this and that, but a stiffening of the vertebrae which will cause them to be loyal to a trust, to act promptly, concentrate their energies; do the thing—"Carry a message to Garcia." General Garcia is dead now, but there are other Garcias.

No man who has endeavored to carry out an enterprise where many hands were needed, but has been well nigh appalled at times by the imbecility of the average man—the inability or unwillingness to concentrate on a thing and do it. Slip-shod assistance, foolish inattention, dowdy indifference, and half-hearted work seem the rule."

This willingness to do mediocre work, or even worse, this want of dissatisfaction with it when poorly done is a poison that is not confined to the veins of the dullard and the ignorant. It is so widespread and insidious that last fall at the opening of the Normal College, President Jones asked the 1,000 students in attendance to take as

their motto for the year, "I will try to do my work better than well enough."

That person who accepts a position, or chooses a vocation chiefly because it will be an easy place or calling, has elected to rust out rather than to wear out.

He chooses the corroding accumulations that cling and deaden and refuse to move instead of the brightening and polishing process that in time easily unlocks treasures to him at first undreamed of. But on the other hand:

"There are nettles everywhere;
But smooth green grasses are more common still."

So, over against those loitering, listless toilers are the hosts of laborers who find actual delight in working. To them duty is not drudgery but service to their home ones and to the world at large. Work, to such an one, is but one means of acknowledging the debt he owes for what he possesses, a joy in being alive and able to be a part of activity. He feels himself a co-worker with the Creator, a laborer with the master, who, when a child, said, "My father worketh hitherto and I work."

In every neighborhood there are lustrous examples, for the world is bright with the unselfish devotion to duty of unsung heroes and uncrowned queens of labor. I have but to name one class—doctors—country doctors—if you would have it shine still brighter—and every one of you recall some medical man who has stood unflinchingly at his post for the use he could be in his profession. Only a few days ago I read of one of these country doctors. It was written of him that he left to his white-haired sister only the homestead and a few thousand dollars as material heritage from his goodly life; but on his books, as richer legacy, his executor found thirty per cent of his bills of a lifetime uncollected and never to be collected, against which stood the brief entry, "Poor,—no bill."

Prof. Eliot ascribes Mrs. Alice Freeman Palmer's self-sacrifice largely to her early association with her physician father.

In these days when industrial problems of every phase are in ferment, it is well to remember that the essential things are the simpler things,—heat, light, clothing, food and shelter sufficient for health. The remarkable things are the common—love, kindness, long-suffering and unselfish devotion to duty. The solution of many of our problems must be by a process of elimination, a sifting out the things that are not "worth while." Machinery has almost made automatons of workmen. There is much to excuse them for want of interest in what they do. But in the farm and home work, there is ample scope for letting the best of ourselves have full play.

PRACTICAL EDUCATION FOR GIRLS.

BY MISS MAUDE GILCHRIST, DEAN OF WOMEN'S DEPARTMENT, AGRICULTURAL COLLEGE.

We have heard a great deal in the past few years about education for culture as distinguished from education as training,—the one involving brain activity merely, the other eye and hand activity. We ought to have both,—the true education is a drawing out of all the powers. Work and thought should not be separated. If they are, the workman becomes only a machine—poor fellow that he is—and the mere thinker a snob,—a poorer fellow still.

What do you want to make of your daughter? Perhaps, because of the strain and stress in your own life, you wish for her a life of leisure and idleness. If so you do not want the education we have to propose. Or should you entertain ambitions to have her take a man's place in the world, to hold it by a man's methods, becoming aggressive and hard, this education is not for her. But if you wish her to be a womanly woman, one who is gentle as well as practical, who uses common sense in dealing with every day affairs, who makes of home a haven of rest and joy for family and friends, then we start from a common vantage point.

By practical education we mean, in general, such training in the affairs of every day life that the girl may be able to cope with the situations of life and that she may be more effective for good in her community. Since every girl must be a member of society, her education should not only prepare her for her individual work and life, but also for her work and life in the community. She should be worthy herself and she should do something worthily, and the two go hand in hand. This education is not then limited. It means intellectual training, moral training, physical training. It is social as well as technical. Is its aim to turn out cooks or dressmakers as artists or workers in any special line? No at all. It aims, in general, to develop the all-around woman whose trained faculties give her an assured place in any community or society. Practical education for girls must preserve and emphasize feminine ideals. It will fail in the artist if these be omitted. The principle of the eternal feminine we cannot overlook. "The eternal womanly will lead man ever onward and upward" sings Goethe. A strong moral and religious character must be the foundation of every right life. The girl who has received this training in everyday affairs will be polite and will help conserve this virtue of civilization. She will take her place among others and keep it because she observes the amenities of social intercourse.

The average schooling of the boys and girls of our country is only about four and a half school years. Much is to be learned in that time. Too much is attempted. But do we give the very best that we might give? The vast majority of those who fall out after the earliest school training, do so because they are compelled to do it. They must earn their living in some way by the labor of their hands. Now, if this

fact of making a livelihood be recognized in the school, the girl will be glad to prepare herself for bread winning and will go out proud of her ability to do so. There are girls in every community, as you know, who need something to do, or they go to the bad. Occupation is salvation. Why, then, should not classes in sewing, or cooking, or drawing, or gymnastics be formed? Or a library and reading room, or a garden be opened up, so that these girls may have a chance to use their hands and idle powers?

This practical education should, therefore, prepare the girl, specifically, to earn her living, to be a home maker and housekeeper an dto take her place as a citizen in the world of affairs.

It is interesting and important to note in connection with the higher education for women, that they still prefer the old profession, that of home-making, if they have the chance to enter it. They remain quite like the women of previous generations in this respect. And why should they not? What nobler vocation is possible for any woman? Woman's duties have so increased in recent years,—she must be ready to act on school boards, and boards of control, as director or secretary of philanthropic and charitable enterprises, as member of library commissions or of industrial and civic committees,—so that she must be informed on history and economics, literature and politics, and the various questions of the day. These enlarge the scope of education and cannot of course be expected to find place as such in the secondary schools. But the other points need definite attention. If it be a crime, as Horace Mann once said, for a boy to grow up ignorant of reading and writing, it is equally a crime for a girl to be ignorant not only of these, but of household economics as well. She gets, to be sure, something of this at home, such as cooking, sewing, nursing, but in a haphazard, unscientific manner. We must, therefore, advocate the study of domestic art in its various branches, the use of the needle and scissors in dressmaking, millinery, sewing, art embroidery. For dressmaking should be a trade carried on by business methods. Girls need training in the use of the hammer and saw, in wood work and wood carving. A woman need not be thought queer should she know how to use such common tools, nor a criminal if she should actually repair her gate, for instance, when its needs repairing.

We advocate, also, the use of the pencil in drawing, design and architecture. This teaching may not develop artists, but it does develop ability to see things as they are and to put beauty into common things. That designing and architecture are productive fields for woman's activity has been abundantly proven in many instances.

The girl should have regular study and practice in domestic economy; home-making, sanitary science in its simpler phases, home-direction, housekeeping in general, as laundering, care of furniture, linen, rugs, marketing and buying. She should be trained in business methods and keeping of accounts, for many a woman's venture has gone to the wall simply because of lack of the knowledge of some fundamental business principles. She must have training in cookery. We are no longer willing as a nation, to eat unpalatable, indigestible messes under unhygienic conditions, nor to submit to the waste once prevalent among us. Scientific cookery aims to eradicate these faults so that we need not be the horror of thrifty European observers, and the despair of eager economists. Practical training in these various sub-

jects makes possible greater economy in all our resources and this would be of special value to that class which most needs economy, the very poor. No truer proverb was ever penned than this: "The destruction of the poor is their poverty." Is it not a consummation devoutly to be wished that the small girls who are to suffer through life the hardships of poverty, that they should by skill be able to multiply the one loaf into two and the one garment so that it should clothe two?

We must advocate still further the opportunity for woman's study of landscape gardening, plant culture and horticulture, of dairying, poultry raising, bee-keeping and the like. Various instances might be cited of the success of women in these lines. Let the girl exercise her constructive faculties, her executive faculties and let her see that her own labor, the work of her hands, is an honor to her. No girl, rich or poor, should feel that she is above actual work.

It is not necessary, as Pres. Hadley suggested in a recent address, to reconstruct the collegiate courses to meet the needs of those who do not want them. But it is necessary to provide training for that vast industrial army which the conditions of the twentieth century require. Not twenty years have passed since the practical training of girls was begun in our country; and yet great advance has been made, since that small beginning in North Branch Street, Boston. The movement has spread to remote paces and is destined to contribute much to the world's good.

What doth it profit a woman, my friend, to know either Latin or French, if she understand not the speech of children, or of the people at her gate? Is it not better that she should know the fruits and roots the vine and flower and of their powers to nourish and beautify, than that she should have knowledge only of the fruit and flower and vintage of literature? that she should be able to grow the common potato and the corn rather than have acquaintance with plants in the abstract merely.

A woman may have studied calculus and have traced a comet's orbit—a stronger woman will she thereby be—but if she might also calculate dietetic value of the foods on her table, or estimate the hygienic condition of her cellar, then, indeed, would the household rise up to call her blessed. A knowledge of bases and salts, of acids, and alkalies, of poisons and antidotes even, will not suffice when a woman wants to make a nourishing loaf or an appetizing soup.

The woman who can pour balm and oil on the wound and bind up the broken heart, restoring to health both body and spirit, uses her God-given skill far more effectively than she who can play the Fifth Symphony or paint a portrait merely. It is all very well for one to study the philosophy of Plato and Kant and even to forget it all, but suppose she has failed to study the philosophy of love, that she understands not the principle of womanly sympathy nor practices that of sisterly kindness? All these things are good, but let us add unto them these others, also.

Let us have, then, the liberal training of the arts and the liberal training of the industries as well. The heritage of the ages belongs to your girls, let them enter upon their inheritance. The twentieth century, the industrial age, is upon us, let them be prepared for their part in it.

THE PERPLEXITIES OF THE HOUSEWIFE.

BY MRS. EMMA A. CAMPBELL, YPSILANTI.

The motive of the Women's Congress is to raise the standard of the work of the housewife. It has been thought that a woman could manage domestic affairs without any special training and with little brain power. This, if ever true, is not true to-day. At no time has more value been put upon woman as the housewife than at the present.

Prof. Atkinson says the family of the average American spends one-half the income for food. Surely this should not be true. When all girls shall have the practical education of which we have heard to-day, it will not be true and the perplexities of the housewife will be fewer in number and less appalling in character. Education should fit a girl for her life work.

The zoologist's daughter says "papa, speak kindly to Edward to-day for I am fond of him and I want to be his wife." "Be his wife! Wife indeed, a pretty wife you would make when you don't know how many joints a lizard has."

The sweet girl graduate bases her fitness for marriage and the duties of the housewife, on the fact that she can make nice fudges and lovely chocolate creams. John, when he calls, finds her so charming, as she dispenses these sweetmeats, that he feels he can eat chocolate creams all the rest of his life, if only Mary sits on the opposite side of the chafing dish. There are perplexities enough for the housekeeper whose scientific knowledge has not been confined to lizards and whose culinary accomplishments are not exhausted in making chocolates, fudges, etc. "Where are you going to live, Mary?" "I don't know, we haven't got that far yet." "Well," said the unsentimental older woman, "once you are married it is the first place you will reach." And she was right. Mary's practical education should include some knowledge of house building and house sanitation. "What! A woman build a house?" Yes, woman lives in the house more than the man does, most of her work is done there, and she ought to know—it is her business to know—what is needed for the family health and for her own convenience. Many a housewife finds herself appalled as she looks at the mountain of apparent duties.

Let us consider a few of the perplexing questions the housewife has to answer. How shall I build my house, and how shall it be furnished? I will say here, in passing, it has been my attempt, in this address to voice the perplexities of the women of Michigan made known through the question box, during my four years' experience in institute work.

Building the house.—It is of the greatest importance that the house should be adapted to the circumstances of its occupants. Desire to have a fine house has led many young people into debt on the pretext that it is better while building to build such a house as will meet the wants of the family through all the future. A large house is built,

of which only a small part can be finished and furnished while the rest, with all the idle money which it represents, is a constant burden to the housewife who is often broken in health in her attempt to do herself justice in a large and useless house on limited means.

As the family grows larger, and the pocket-book fuller, additions can be made, or, what is better, the small house can be used as a tenant house and a larger one built in its place. It is a mistake to think that a very small house may not be both convenient and artistic. With living room, kitchen, pantry and wash room on first floor any small family may be comfortable. The living room furnished with Holland shades, and a few hardy houseplants at the windows, a dining table that can be converted into a center table with bright spread and student lamp, a case of well selected books, two or three choice pictures, a couch and chairs, a hardwood floor with rugs, and you have a room into which you may invite your guests with pride. A wash-room in a house of limited resources can be used for many things besides the laundry work. It can be used for a bath room, for washing milk cans and other rough work, and everyday hats, coats and bonnets can be hung there. In the upper rooms we settle the perplexing question, "How shall the chamber in a country home be heated?" A little upstairs sitting room is formed by cutting off a small corner of each bedroom thus forming an octagon, in the center of which is a drum on the stovepipe of the living room stove. Your bedrooms can thus be comfortably warmed by waste heat—the heat from the chimney of the kitchen and wash room stoves, the waste heat from the living room, that goes up the stairs and the heat from the pipe through the drum.

The larger house.—When one can afford a larger house, how will we proceed? I would say, start with the kitchen. So much of the housekeeper's time must be spent in the kitchen, at work that, at the best, is hard enough and monotonous enough, this room should be just as bright and handy as possible. If practicable, locate the kitchen on the west side of the house with the pantry on the north. It will be much cooler in the forenoon while the work is in progress. An east front for the house is desirable for, in the summer, the family wish to sit on the porch in the afternoon, and in winter we have the advantage of the morning sun. A south and east exposure leave nothing to be desired for a winter family room. Be sure your walls are double boarded with building paper between. This will make a wall both dry and warm. Have both well and cistern pump in the kitchen. To this end it is not necessary to have both well and cistern under the kitchen floor; they may be outside the house, and the water drawn in laterally. The fuel supply for the kitchen stove should also be stored on a level with the kitchen, thus avoiding steps.

There are farmhouses in Michigan where the water supply is brought by woman power from the creek at the foot of the hill, and an ax leaning against a log of green wood points to the fuel supply, and this when we know it costs less to take care of a woman than to bury her. There are many really fine houses where every pail of water, every hod of coal, or armful of wood, must be brought up several steps.

There are no objections to steps at the front of the house but at the back, where there is so much going out and in with burdens, steps should be avoided.

The matter of a dry cellar is very important and one of the most perplexing as well as vexing questions housekeepers have to meet is how to manage with damp mouldy ones. One mistake is in digging the cellar too deep, thus making it damp and unhealthful. The drain should be of glazed sewer pipe, it will cost some more at first but one cannot afford to use common drain tile. Cement the joints thoroughly lest the drain be stopped by the roots of shade trees and clover plants.

My thought of true domestic economy is making best use of everything we possess. Nothing is more priceless than time, too many houses have everything in the wrong place. How many houses have steps between the kitchen and dining room and closets with hooks so high a woman has to climb a chair to reach them. The house comfortable is quite as important as the house beautiful.

Do away with the space under the kitchen stove. Every housekeeper knows how difficult a place it is to sweep clean. Either buy a range without legs, or else take off the legs and put the stove on a raised platform built of brick, or of wood, zinc covered.

The sink is the center piece of the kitchen, there should be no dark little closet underneath to breed mould and cock-roaches, have it perfectly open to be swept like any othe rpart of the floor. Places for pots and pans can easily be found in the cellarway or now as agate ware is so popular and is displacing the heavy iron pots, these utensils can be hung over the kitchen stove. A china closet opening both to kitchen and dining room is a convenience. Another comfort appreciated in hot weather is a refrigerator, this with a drip pan can be placed anywhere.

A chamber maid in a hotel can arrange a half dozen mattress furnished beds while the maid in a farm house is making one fitted with straw and feather tick. I think the bed springs made of best quality woven wire with center reinforced by coil spring are to be preferred to the higher priced ones made entirely of coil spring, specially where two are to occupy the same bed. There is, however, no money to be saved by buying a cheap mattress. The best no doubt are the cotton felt ones. These are just a few of the many perplexities the housewife meets on her way.

SUBSTITUTES FOR MEATS.

BY CARRIE A. LYFORD, AGRICULTURAL COLLEGE.

Next to a knowledge of the underlying principles which should govern the house stands the ability to conduct that home on economic principles that it may become the strong social factor that it should. The profession of the home maker stands next to none in importance, dignity and worth, but until it is undertaken seriously and intelligently by capable women, it cannot rank, in the business world, with the meanest trade or profession.

"Necessity" has always been the watchword which has goaded the weary home-maker on—her work has lacked the incentive of production and competition. But it is time for all that to pass now, an intelligent knowledge of the sciences has taught us that, and the wise practice of economic principles will bring it about. The wise use of the income, and of materials too, is of as much importance as the amount which the income has to offer or the nature of the material. There is nothing of greater importance than judicious business management, the ability to obtain that which will answer the required purpose from the best source and at the least cost.

Meats answer two great purposes in nourishing our bodies, they supply the body with building material and furnish it with fat to produce the heat and energy necessary to life and actions. Meats at times and under some circumstances are dear or not obtainable, so it is necessary to know what one can substitute for meat in the daily bill of fare and to understand, too, how to prepare such substitutes that they will be wholesome, attractive and palatable. Eggs, cheese, milk and peas and beans are suggested as the best substitutes for meat not only because of their similarity in food value but because they are usually easily obtainable and cheap.

Bread omelet—Four eggs, ½ cup milk, ½ cup stale bread crumbs, ¾ teaspoon salt, ⅛ teaspoon pepper, 1 tablespoon butter.

Soak bread crumbs 15 minutes in milk. Add well beaten yolks with the seasonings. Fold in whites. Have omelet pan already heated, butter bottom and sides, spread mixture in evenly. Cook slowly and carefully until well puffed and browned. Fold, turn on platter, garnish with cubes of jelly, and toast points.

Beauregard eggs—Five eggs, hard boiled, 5 squares toast, 1 tablespoon corn starch, 2 table spoon butter, 1 cup milk, ¼ teaspoon salt, ⅛ teaspoon pepper.

Make a white sauce. Chop whites of eggs fine, run yolks through a sieve, add whites to sauce, heat, pour over prepared hot toast, sprinkle a layer of yolks over this, then remainder of whites with yolks on top. Sprinkle top with salt and pepper. Garnish plate with parsley.

Orange cream—Two oranges, juice and grated rind, 1 lemon, juice, ½ cup sugar, 3 eggs beaten separately, ¼ cup of sugar more.

Put juice, grated orange rind and ½ cup sugar in double boiler. Beat 3

yolks very light, add ¼ cup sugar and beat again. When sugar has been dissolved in juice pour over egg yolks, then cook like a boiled custard. When thickened, cut and fold in whites, beaten until dry. Pour over stale sponge cake or lady fingers, chill, decorate with whipped cream.

Rolled sandwiches—Cut bread very thin, in strips. Cream butter, spread rather thickly on bread. Roll and tie with baby ribbon.

Salad dressing—Three eggs, 3 tablespoons sugar, 1 tablespoon mustard, 1 tablespoon salt scant, 3 tablespoons butter.

Beat all together, add 1 cup vinegar, hot, and 1 cup milk. Cook to a smooth custard.

Egg salad—Remove tops from hard boiled eggs, take out yolks, mash, season well with salt, pepper and salad dressing, making quite moist. Refill egg cup, filling with yolk mixture. Arrange lettuce on plate, make a bed of remaining yolk mixture, set eggs up and serve.

Baked bean salad—Arrange baked bean salad on lettuce leaf, garnish with sliced pomolas, pile salad dressing on top.

Cheese croquettes.—One pound grated cheese, 4 egg whites, pinch salt and cayenne.

Beat the whites of eggs to a stiff froth, stir in cheese, salt and pepper. Mould into balls size of a walnut, dip in egg and crumbs and fry in deep fat.

THE INFLUENCE OF HOME SURROUNDINGS IN THE BUILDING OF CHARACTER.

BY MRS. CARRIE IVES SAUNDERS, SAGINAW.

Many mothers plead that they have not time enough to give to their children when they are small and as soon as they are grown they go away from home. The mother is the builder of the home and by a little careful study and planning, she need not work so hard as to destroy her health, or become fretful and ill-tempered.

Do not spend your spare moments piecing quilts. Buy blankets instead, they are more healthful, handled easier, can be washed, and in the end cost less. Do not make rag carpets; the amount paid for the warp, dye and weaving would buy a floor covering of matting or linoleum. Do not scrub your floors until they are spotless and you are too tired to be agreeable to members of your family, scolding the children, and driving them out of doors for fear they will get things misplaced or the floor dirty. If the floor is painted once a year it will cost no more than the soap and brushes and will save your back, knees and head many an ache. Do not pile your table full of good things to eat when you have company, and scrimp the everyday family meals. Your husband, children and yourself like jellies, fruits and cakes as well as the company, and they should be considered first. Let company take the same fare as you have; you will find more time to be agreeable with everybody. Professed friends who only come to see you to get filled

up are not worth the filling. Have the table for your own family always neat and well arranged, and insist that every one observe proper manners; then there will not be any annoying mishaps when company comes or your family dines away from home.

Let in all the sunshine you can, breathe it, eat it, sit in it and be glad. "Count your many blessings every day, count them one by one, and it will surprise you what the Lord has done." Do not allow anyone to speak ill of any of your friends in your presence and speak no ill of others' friends. Life is too short to allow one moment's time finding out the faults of others; we all have a few. Teach your children to be self helpful, putting away their own clothes, opening their bedroom windows in the morning. Boys, as well as girls, while in their school days, should be taught to look after their own rooms, brush and clean their own clothes, sew on buttons, etc. Have the boys' room just as cozy as the girls', give them plenty of good books to read, let them read aloud, discuss the story or history with them; always make the children feel that you and their father are their best friends; gain their confidence in everything; don't laugh at them when they come to you with little worries; listen, counsel well, laugh; keep young for their sake and their friends; keep plenty of young company about you and yours, and you will be surprised to see how young you will always be yourself. Think the best things possible of everybody; seek all the good you can in everybody and you will be surprised how many good traits people have. Don't be afraid to praise your children; make them feel they are of much consequence in the world, not mere nonentities. In after years, as you grow older and need extra attention, they will repay you a thousand fold. I have tried it and know whereof I speak. Always say good morning and teach others around you to do the same. Never let a member of your family go to sleep with a sore heart from some little correction or misunderstanding. It pays to be happy and have others feel happy. Teach children to obey for love of right. Nagging breeds evil in many forms.

Teach children the use and value of money; let them select and pay for things, giving them good counsel, let them know your financial standing. If you are hard pressed they will be more content to wait; teach them early to earn a little money; they will better realize its value. Many children have no voice in the selection of any of their wearing apparel, or know the cost and when they do get hold of any money they usually spend it for things they long have wanted and forget to make provision for necessities. Teach girls to cook, sew, and mend neatly; a good practical cook is many a man's savings bank. Good, practical food that will carry with it satisfying power will always furnish a credit side to the health ledger to draw from.

How delightful is music; every home should have all they can afford in some form or other. It softens the heart, makes us better christians, helps us to purer thoughts. It is the whispering of angels when put to right use and properly executed. Sing, whistle, smile, laugh, do the best you can under all existing conditions, and happiness will be yours.

Home sanitation counts for much in one's life; making work easier by having water handy; slop drains instead of throwing everything out the back door; the cellar should be well ventilated, even in winter, if not, many sick spells can be traced to it.

Teach boys and girls to wait until conditions are favorable and a home in course of construction if possible, before they are married. The waiting a few years longer may save them many heartaches. A young man has not much business ability or forethought who has not attempted to make a home first, and secured the bride afterwards. Paying off debts for all in the home is uphill work; many grow old and die in the attempt. Saving and building can usually be done much better in early life. Think for yourself and teach your children to do so. Many a man and woman have been complete failures because they allowed father and mother to do all the thinking and planning, and when they came to stand alone, they fall, so to speak. Be proud to be able to work, glad you are able to earn money to buy necessary things. Idle men and women are the world's worst enemies and the devil's best friends. The Lord helps those who help themselves.

PRACTICAL LAW POINTS.

BY DAVID ANDERSON, PROSECUTING ATTORNEY, PAW PAW.

(Read at the Shelby and Coopersville Institutes.)

DRAINAGE.

In dealing with this subject I shall not give much of the law that applies to the officers constructing the drain but shall aim to call attention to matters that the taxpayers need to keep track of on their part. The legal theory of a public drain is that the proposed drain shall be conducive to the public health, convenience and welfare. The Constitution of Michigan in the 9th section of the 14th Article provides: "The State shall not be a party to or interested in any work in internal improvement nor engage in carrying on such work." Under this the Supreme Court has held that the legislature can not levy a tax on any particular locality for any internal improvement. Under this also, railroad aid bond and other similar enterprises have been declared void by our courts and the court has been very strict in reference to State aid to any such enterprise. The court has also held with reference to the drain law that no drain can be laid for the benefit to private citizens and that the man benefited can not be taxed unless the drain is a benefit to the public.

All drains are under the charge of the county drain commissioner. He is appointed by the board of supervisors of the county for a term of two years. His compensation is $3.00 per day for the time actually and necessarily employed. He may appoint one deputy from each township and the compensation of the deputy is $2.00 per day. The bills of the commissioner and deputies are audited by a board composed of the judge of probate, county treasurer and county clerk. The pay of the commissioner comes from the drain funds, not from the county treasury. The commissioner has no power to issue an order in favor of himself or his deputies until the bills are audited as required by law.

The foundation of any drain proceeding is the petition. If this is lacking in any material point the whole proceeding is void. The petition must be signed by not less than ten free-holders in the township or townships in which such land or lands to be drained thereby or to be assessed therefor, may be situated. Five or more of the signers shall be owners of land liable to be assessed for benefits for the drain. If there are only three or less property owners liable to assessment for benefits, one or more of such owners of land so liable shall be necessary on the petition. The petition must give a general description of the beginning, route and terminus of the proposed drain. The petitioners are jointly and severally liable for all costs and expenses, if the drain commissioner determine that the drain is unnecessary, and the commissioner may return any application at once for additional signatures if he deems the financial responsibility of the signers insufficient.

On receiving a petition, the drain commissioner examines the proposed drain. If in his opinion it is necessary and conducive to the public health, convenience and welfare, he causes a survey to be made to determine whether the drain is practicable and if found so, he makes his first order of determination. In making this order of determination he necessarily determines that the drain is a public benefit.

The commissioner then procures the right of way from the land owners by getting voluntary releases if he can. If your land is of small value and you want the drain, give the release, if otherwise, refuse to give it and the commissioner will take a somewhat complicated proceeding through the probate court to condemn your land. In this proceeding you may have a jury, or not, as you choose, and in this proceeding you may contest the public necessity of the drain and if you can convince the commissioners or the jury that it is of no public necessity, the drain will not be constructed.

If in this proceeding the drain is deemed a public necessity your damage will be ascertained and paid to you. Remember that with the release of right of way, you grant a sufficient width of ground on each side of the center line for the deposit of the earth removed in constructing the drain.

The next step of interest to you is the time of letting contracts. The notice of drain letting shall be a ten days' notice served personally on all residents of the township, owning land liable to assessment, also by posting in five public places of each township traversed by the drain and by publishing at least twice in some weekly paper of the county. This notice must contain a description of every parcel of land to be assessed and it must also state that at the time and place mentioned in the notice, the assessment of benefits and the lands composing the district will be reviewed by the drain commissioner. At this time the commissioner assesses to you the per cent of the whole cost of the drain your parcel of land must bear. He may at this time change and adjust these percentages to make them equitable and he may even strike out some of the parcels of land receiving no benefit but he cannot add any parcel not included in his notice. This day of review may be adjourned if found necessary.

At this review, the commissioner also determines whether your assessment shall be paid in one or more payments. If in more than one, you pay one-half the first year and the balance in one, two or three years as the commissioner decides.

The drain commissioner thereupon proceeds to let contracts for digging to the lowest responsible bidders. The parties assessed for benefits shall be preferred as bidders, if other things are equal. You should watch the construction of the drain, because if you think it improperly constructed and the entire cost exceeds $100 any two persons assessed for benefits may have the sufficiency of the work determined by the county surveyor.

The assessment when made and fixed by the commissioner is subject to appeal. You are grieved at your assessment as fixed by the commissioner. In ten days apply to the judge of probate for a board of review. He will notify the commissioner and a board of three disinterested freeholders, not residents of the township affected, are drawn. This board reviews the assessments, determines whether they are just or not, alters them as it deems proper and may add lands to the district, if upon personal inspection of the district they determine that they ought to be so added but to do this the day of review must be adjourned and a proper notice given to the owner whose land is to be added. The determination of this board of review when completed is final.

The foregoing assessment is merely the determination of the per cent of the costs of the drain each particular piece of land shall bear. Therefore it is that the land owner is often lulled to security by the small innocent looking 5, 7 or 10 per cent, that appears against his land. This per cent becomes fixed and settled before anything appears in the shape of dollars and cents. The contract being let and the assessment of per cent having become final the commissioner then proceeds at once to compute the cost of the drain and apportion this cost to the several parcels of land, according to the per cent before determined and then the taxpayer often arises to a realization of the fact that he really did not want the drain any way. Then he is apt to say hard things about the land, still harder things about the county drain commissioner and perhaps he consults his attorney. In most such cases, the expense of this consultation is added to the cost of the drain to the particular taxpayer consulting. Because as a rule the tax is regular and must be met and curses whether loud or deep do not alter the matter.

Note one matter of importance that is not generally understood. If you have any idea of selling your land you understand that your general taxes become a lien against the land December 1st, and if you sell by warranty deed before that date the purchaser pays the tax, if after that date you pay the tax. Not so with drain taxes. As soon as the commissioner makes his computation he makes a special assessment roll where each different description of your parcels taxed with all others appears and the amount of your tax is extended thereon. As soon as this is done that drain tax becomes a lien on your land and if you sell by warranty deed you must pay that tax.

Remedies have been partly touched upon in the progress of this paper but a few others may be noted. If the first petition is defective the whole proceeding will fall at the touch of litigation. If the proceedings establishing the drain are defective in any essential particular the said proceedings may be reviewed upon certiorari. This is a simple and comparatively inexpensive remedy, but fortunately (for the legal profession) it will take a lawyer to manage it for you so all I need to

say here is, you must take advantage of this remedy by beginning your proceedings within ten days after the drain commissioner files his final order of determination with the county clerk which he should do within five days after he gets the right of way for the drain.

The drain taxes are collected the same as any other taxes and if the assessment is defective in any essential the favorite remedy is to pay under protest. The protest should be in writing and specify particularly the ground for claiming the tax to be illegal. Suit must be brought to recover the amount within 30 days. Here again your attorney must manage your case.

In concluding this subject let me say, Don't have anything to do with asking for a drain unless you want it and expect to pay whatever comes against you. And if your neighbors force the drain upon you and you wish to fight be diligent and take advantage of every step. If you can break the first petition you have broken the drain. If you can convince the jury called in condemnation proceedings that no public necessity exists you have defeated the drain. But if you fail on these two points and your objection is to some later proceedings, the law requires whatever tribunal you bring your case before to reverse all proceedings subsequent to the error you point out and direct the commissioner to commence at his mistake and do it over again and present you his bill when he has finally succeeded in getting things right.

PARTITION FENCES.

All fences 4½ feet high and in good repair, consisting of rails, timber, boards or stone walls or any combination thereof; and all brooks, rivers, ponds, creeks, ditches or hedges and other things which shall be considered equivalent thereto, in the judgment of the fence viewers within whose jurisdiction the same shall be, shall be deemed legal and sufficient fences. The respective occupants of lands enclosed with fences shall keep up and maintain partition fences between their own and the next adjoining enclosure in equal shares, so long as both parties continue to improve the same. You will notice that two things are necessary in order for you to compel your neighbor to build a share of the line fence. First, that the adjoining parcels be enclosed and, second, that both parties continue to improve their land.

Two different questions may present themselves to the man who examines the line fence between himself and his neighbor. The line may be divided between them and the question then presents itself whether the partition fence is properly constructed or not. If that be the question and one party neglects to repair or rebuild the fence which of right he ought to maintain, the aggrieved party may complain to two or more fence viewers of the township, who, after due notice to each party, shall proceed to examine the fence. If they find the fence insufficient they give the delinquent written notice and direct him to repair or rebuild the same within such time as they deem reasonable and if the delinquent does not do as directed, then the complainant may repair or rebuild the fence. When he has built the fence for his neighbor and the fence viewers find it sufficient they determine the value of such repair and building and their own costs and make a certificate for this amount and the complainant shall have a right to

demand, either of the occupant of the land or owner, where the fence was deficient the amount so ascertained. If he does not pay it by the first day of October after the demand is made, the same becomes a lien on the land and is returned to the assessor and collected as other taxes are.

The other question which may present itself to the land owner is that not only an insufficient fence exists but no division of the line has ever been made. In this case the line may be divided by agreement in which case the agreement should be in writing, signed by the parties and filed with the town clerk. If they can not agree, the fence viewers in this case determine first the particular portion of the line to be fenced by each occupant and if the fence is insufficient, they settle that part as I have before stated. If in this case they find either of the occupants had before any complaint was made, voluntarily erected the whole fence or more than his just share of the same, the other occupant shall pay for so much as may be assigned to him to repair or maintain of this fence. The fence viewers may determine the value of this part.

When one party shall cease to improve his land or shall open his enclosure, he shall not take away any portion of the partition fence belonging to him and adjoining the next enclosure if the owner or occupant of such adjoining enclosure, will pay what two or more fence viewers determine to be the value of this portion of the fence, the payment to be made within two months; or, vice versa, if unenclosed land be afterwards enclosed when one has built the whole of the fence then the other one must pay the value of one-half the fence as determined by the fence viewers and if the payment in this case is not made within 30 days after demand then it may be collected in the general taxes as mentioned before.

When any person makes up his mind not to improve any part of his land adjoining a partition fence that may have been legally divided he must give six months' notice of his determination to all the adjoining occupants of land and after the end of this six months he is not required to keep up any portion of the fence as long as the land lies open and unimproved.

TRESPASS OF ANIMALS.

Closely connected with the matter of partition fences is the question of trespasses committed by animals. The laws provide that when any person is injured in his lands by sheep, swine, horses, asses, mules, goats or neat cattle, he may recover his damages in an action of trespass, or trespass upon the case against the owner of the beasts or against the person having the care or control of the beasts, or by destraining the beasts doing the damage. But if the beasts shall have been lawfully on the adjoining lands and shall have escaped therefrom in consequence of the neglect of the person who has suffered the damage to maintain his part of the division fence, the owner or person having control of the beasts shall not be liable for damage.

Probably nothing is better understood than the fact that animals doing damage may be impounded by the person suffering the damage. If there is a public pound in the township, the animals should be

confined there, but as is commonly the case there is no pound and the person suffering the damage has the right to shut up the animals in his own enclosure and hold them for the damage suffered. It is safe to say that in the majority of cases where animals are so impounded, the person taking them up does not know what to do with them in compliance with the law after he has them shut up.

The person shutting up beasts must within twenty-four hours thereafter give notice in writing to the owner or person having the care and control of the beasts, if that person be known and is living within six miles of the place of impounding. This notice shall be delivered to the party or left at his last place of abode, and shall contain a description of the beasts and a statement of the time, place and causes of impounding.

If there is no one entitled to notice as above, the person impounding the beasts shall within forty-eight hours thereafter cause notice to be posted in three public places in the township and in one public place in each of any two adjoining townships, if within four miles of the place they were taken, a written notice containing a description of the beasts and a statement of the time, place and cause of impounding. If notice be by posting and no person appear to claim the beasts within seven days after impounding, then a like notice is to be published for three successive weeks in some public newspaper, if there be such paper within twenty miles of the place of impounding, and the first publication must be within fifteen days after impounding. Supposing the owner of the beasts to be known and to have received notice, he may pay the claim made by the person impounding the beasts and is then entitled to take his animals away. But if he is dissatisfied with the claim made, then he may demand that some justice of the peace appoint two disinterested and discreet persons and put them under oath to determine the amount that shall be paid, and the sum determined by them shall be received instead of the sum demanded by the person who impounded the beasts.

In case the sum for which the beasts are impounded shall not be paid within fourteen days from the date of notice, or after the last publication, of notice in the newspaper where that method is required and the amount shall not have been determined by persons appointed by the justice as above noted, then the person who did the impounding shall apply to a justice of the peace and have two disinterested and discreet persons appointed and sworn by the justice, and these persons shall ascertain and determine the amount that ought to be paid by the owner or keeper of the beasts for damages, costs and expenses for which they are impounded and detained, and this sum shall include a reasonable compensation for their own services. And if the sum so found due is not forthwith paid, then the animals are sold at auction on five days' notice, given by posting in three public places in the township where impounded, and from the proceeds of the sale all damages, costs, expenses and charges for advertising and selling are paid, and the balance is deposited in the treasury of the township for the use of the owner of the beasts in case he substantiates his claim thereto within two years from the time of sale.

Any rescue of impounded beasts is an illegal act, and they may be re-taken by the poundmaster or person holding them, and the person rescuing them is liable to a penalty of twenty dollars to be recovered

in an action. In case of a rescue, the person so rescuing cannot defend against an action for this penalty on the ground of insufficiency of fences, though he may do so if he pursues his lawful rights.

Another and perhaps the most common method for getting your animals back if you have them improperly destrained is to replevin them, in which case on your giving security as provided to the person who has impounded the animals the beasts will be returned to you, and then if the reason for impounding is found to be correct, the owner of the beasts will pay all of the damages and the costs, charges and expenses, and the costs of the action of replevin. Whereas, if it appear upon the trial that the beasts were destrained without any sufficient cause, then the owner of the beasts gets damages for the unlawful detention and his costs of the replevin suit.

Another law very closely related to the one we have just been considering is the act to prevent the running at large of animals. Animals cannot run at large in the highways unless by resolution of the board of supervisors such running at large is permitted. If no such resolution is in force in your county, it is the business of the overseer of the highways to seize and take into possession any animal which is forbidden to run at large and which may be running at large in any highway of which he is overseer.

It is also lawful for any person to seize and take into his custody and possession any animal which may be in any public highway opposite the land owned or occupied by him with no keeper in charge and it is equally the right of any person under this law to take into his possession any animals which have entered his premises from the highway.

The person taking up estrays shall forthwith cause a description of the animal or animals to be entered upon a book to be kept by the clerk of the city, town or village in which the animals are taken up, and he thereupon gives immediate notice to a justice of the peace or the commissioner of highways of the township in which such seizure and possession shall have been taken and such justice or commissioner gives notice by affixing the same in three public and conspicuous places in the town, city or village, one of which places shall be the district schoolhouse nearest the residence of such justice or commissioner.

This notice contains the information that such animal or animals will be sold at public auction at some convenient place which is named in the notice, which time shall be not less than fifteen or more than thirty days from the time of posting notice. At this time the animals are sold at auction, and the charges of the impounding and sale and advertising are deducted, and the surplus is to be retained by the justice or commissioner and paid to the owner or owners of the animal if he shows his right to the same within one year after the sale. If he does not show his right within that time, the price of the animal is forever lost to him. It goes to the treasurer of the township and his receipt is a discharge to the justice and commissioner. The owner of the animal, however, has a right to redeem his beast at any time within six months after sale by paying the expenses of the custody and sale and a reasonable compensation for keeping the same.

The owner of the animal may likewise at any time before sale demand possession of the animal, and upon payment by him of the costs

of the justice, or commissioner, or other person making the seizure, and paying also a reasonable compensation for the care and keeping of the animal, which amount is to be estimated and fixed by the justice, or commissioner, and upon paying these sums he is entitled to his animal, and if he makes this demand and proves the ownership at least three days before the time appointed for the sale, he is only required to pay one-half of the costs specified, together with the full amount of compensation.

DOGS AND SHEEP.

Any person may kill any dog that he may see chasing, worrying, wounding or killing any sheep, lamb, swine, cattle or other domestic animal, out of the enclosure or the immediate care of the owner or keeper, unless the same be done by the direction of such owner or keeper. He may also kill any dog that may suddenly assault him while he is peaceably walking or riding anywhere out of the enclosure of the owner or keeper of such dog.

The owner of any dog guilty of any of the above acts is liable in double the amount of damages which may be proved in an action brought therefor, and it is the duty of the owner or keeper of any such dog to cause said dog to be killed within forty-eight hours after having received notice that the dog had committed any of the acts specified, and for every neglect so to do he shall forfeit the sum of three dollars and the further sum of one dollar and fifty cents for every forty-eight hours thereafter until the dog be killed, unless he make it appear satisfactory to the court before whom the action is tried that it is not in his power to kill the dog. The penalty recovered in the action last referred to goes to the general fund of the township treasurer.

Every person in possession of any dog, or who shall suffer any dog to remain about his house for the space of fifteen days previous to the assessment of the taxes or previous to any injury, chasing, worrying or killing sheep, shall be deemed the owner of such dog, and any person who knowingly keeps a sheep-killing dog or who keeps any dog after it has come to his knowledge that such dog has been engaged in the killing of sheep is guilty of a misdemeanor and may be fined not less than ten dollars nor more than fifty dollars, and may be imprisoned in the county jail not more than three months.

The person losing his sheep or his lambs by any dog or dogs has the same appraised by a justice of the peace and receives his pay out of the dog tax fund which is provided by the statute.

TELEPHONES.

Complaint is often made that in the erection of telephone lines the shade trees along the highways are mutilated and destroyed by the persons putting up the poles and wires.

The statutes provide that telephone companies may construct and maintain their telephone lines along, over, across or under any public places, streets and highways, and across or under any of the waters of this State, but the same shall not injuriously interfere with other

public uses of the said places, streets and highways, or injure any trees located along the line of said streets or highways. Any telephone company which injures the shade trees along the highways in putting up its wire is liable to all damages on account thereof, and these damages can be collected in the ordinary method. Or, if the damage were threatened and sufficient time existed for pursuing that remedy, an injunction would doubtless be granted to restrain the injury threatened.

COUNTY PRESIDENTS AND SECRETARIES FOR 1903-4.

County.	President.	Address.	Secretary.	Address.
Alcona	Albert Walker	Harrisville	L A. Colwell	Harrisville.
Alger.*				
Allegan	Chas W. Button	Hopkins	Edward Hutchins	Fennville.
Alpena	Shepton Fox	Long Rapids	Geo T. Cathro	Cathro.
Antrim	Wm. L. Frink	Kewaden	G. M. Hewitt	Kewaden.
Arenac	Nelson Ireland	Standish	H. A. Chamberlain	Standish.
Baraga	L. J. Gallagher	Baraga	H. Lundin	Baraga.
Barry	Jas. M. Bauer	Hastings	J. F. Edmonds	Hastings.
Bay	O. W. Grover	Willard	Wm. McKay	Kawkawlin.
Benzie	Cory Adams	Inland	R. B. Reynolds	Inland.
Berrien	F. C. Franz	Niles	R W. Reese	Eau Claire.
Branch	A. L. Smith	Girard	Isaac Corless	Coldwater.
Calhoun	C. J. Miller	Battle Creek	Wm. A. Powell	Marshall.
Cass	G. H. Redfield	Edwardsburg, r. r. 1	Clarence F. Wells	Cassopolis, r. r. 3.
Charlevoix	E. B. Ward	Charlevoix, r. r. 1	R. W. Paddock	Charlevoix.
Cheboygan	Jno. Schannenk, Jr.	Cheboygan	C. F. Smith	Cheboygan.
Chippewa	Thos. Morrison	Pickford	Frank H. Taylor	Pickford.
Clare	F. A. Carncoos	Colonville	Fred Hudson	Clare.
Clinton	E. E. Warren	Ovid	A. H. Warren	Ovid.
Crawford	Henry Funck	Pere Cheney	John A. Love	Roscommon.
Delta.*				
Eaton	Jas. H. Gallery	Eaton Rapids	Geo. A. Perry	Charlotte.
Emmet	E. A. Botsford	Petoskey, r. r	Henry R. Miller	Petoskey.
Genesee	O. W. Tock	Flushing	Holden W. Phillips	Davison.
Gladwin	E. N. Fairchild	Dale	H. R. Clarke	Gladwin.
Gd. Traverse	Lowell Sours	Elk Rapids	E. O. Ladd	Old Mission.
Gratiot	Newton Burns	St Louis, r. r. 1	C. A. Vandeventer	Ithaca, r. r. 5.
Hillsdale	E. T. Parker	Hillsdale	N. I. Moore	Jonesville.
Houghton	J. H. Jasberg	Hancock	Ira E Randall	Houghton.
Huron	J. J. Murdock	Pigeon	John Harrison	Bad Axe.
Ingham	Chas. Clark	Dansville	R. J. Robb	Mason.
Ionia	A. M. Willett	Ionia	Fergus Flanagan	Orleans.
Iosco	John Sullivan	East Tawas	John W. King	Vine.
Iron.*				
Isabella	Chas. M. Brooks	Mt. Pleasant	M. E. Kane	Mt. Pleasant.
Jackson	B. F. Peckham	Parma	Harvey L Foster	Parma.
Kalamazoo	Milo A. Snow	Richland	L. H. Stoddard	Kalamazoo.
Kalkaska	Wm. Dick	South Boardman	J. Dix Brown	South Boardman.
Kent	Geo. E. Rowe	Grand Rapids, r. r. 3	Geo. F. Richardson	Grand Rapids, r. r. 5.
Lake	A. A. Miner	Luther	Philip A. Hoover	Luther.
Lapeer	E E. Owen	Lapeer	Fred Palmerlee	Lapeer. r. r. 2.
Lenawee	E. A. Taylor	Onsted	Samuel Young	Blissfield, r. r. 1.
Livingston	Frank Backus	Howell	Herbert M. Wells	Howell.
Macomb	A. M. Keeler	Richmond	A J. Freeman	Romeo.
Manistee	Hugh Kinney	Chief	Erastus Potter	Chief.
Marquette.*				
Mason	C. G. Wing	Ludington	Charles Houk	Ludington.
Mecosta	A. G. Woodward	Sylvester	John E. Reiter	Sylvester.
Menominee	Ira Carley	Ingalls	G. T. Werline	Nadeau.
Midland	Thos. Fisher	Laporte	J. D. Studley	Crane.
Monroe	F. F. Herkimer	Scofield	Richard Vivian	Monroe.
Montcalm	J. H. Arbogast	Coral	Carl Weinrich	Trufant.
Montmorency	Alonzo Smith	Atlanta	Geo. McClenathen	Atlanta.
Muskegon	Thos. F. Rogers	Ravenna	Geo. F. Rouston	Ravenna.
Newaygo	J. H. Edwards	Newaygo	G. W. Gehlback	Fremont, r. r. 2.
Oakland	Thos. J. Jones	Pontiac	Wm. Williamson	Pontiac.

* No county institute society.

COUNTY PRESIDENTS AND SECRETARIES FOR 1903-4.—*Concluded.*

County.	President.	Address.	Secretary.	Address.
Oceana	R. E. Southwick	Houseman	R. H. Taylor	Shelby, r. r. 2.
Ogemaw	E. W. Clark	West Branch	John Regan	West Branch.
Ontonagon	A. S. Cornell	Ewen	W. B. Hatfield	Ewen.
Osceola	J. R. Hurst	Reed City	John Schmidt	Reed City.
Oscoda	S. E. Parks	Mio	Fred Caldwell	Biggs.
Otsego	Arthur W. Rush	Vanderbilt	John H. Fisher	Gaylord.
Ottawa	Dirk Elenbaas	Zeeland	Henry Boeve	Holland, r. r. 5.
Presque Isle	Geo. Ingalls	Millersburg	Martin Frafelet	Millersburg.
Saginaw	Jas. A. Slocum	Saginaw, W. S. r. r. 8	John Ure	Saginaw, W. S. r. r. 8.
Sanilac	R. Pearson	Urban	D. H. Dawson	Sanilac Center.
Schoolcraft	J. J. Riley	Manistique	Fred Greenwood	Manistique.
Shiawassee	A. L. Chandler	Corunna	John Caruthers	Bancroft.
St. Clair	James Dunn	Emmet	Jos. W. Avery	Jeddo.
St. Joseph	Orville Dougherty	Three Rivers	R. M. Cauffman	Centerville.
Tuscola	J. J. England	Caro	W. F. Dowling	Akron.
Van Buren	E. L. Keasey	South Haven	Frank Warner	South Haven, r. r.
Washtenaw	C. M. Fellows	Saline	A. D. Crittenden	Saline.
Wayne	Randolph Graden	Taylor Center	Mrs. Edith M. Wager	Carleton.
Wexford	T. H. Callis	Manton	Wm. Rose	Manton.

COUNTY INSTITUTES WITH DATES AND ATTENDANCE.

County.	Date.	Place.	Attendance.							Total.	Average per session.
			1st day.			2d day.					
			A. M.	P. M.	Eve.	A. M.	P. M.	Eve.	W. S.		
Alcona	Jan. 12-13	Harrisville	15	38	160	40	49	.....	83	585	64
Alger*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Allegan	Feb. 20 21	Allegan	26	38	110	25	.....	.....	7	206	41
Alpena	Jan. 16-17	Long Rapids.	7	41	82	12	35	.....	37	214	36
Antrim	Jan. 30-31	Alden	30	100	127	82	132	.....	135	606	101
Arenac	Jan. 26-27	Standish	60	100	400	95	80	.....	65	800	134
Baraga	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barry †	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bay	Jan. 5-6	Auburn	22	59	152	62	65	130	68	558	79
Benzie	Jan. 7-8	Honor	.....	80	80	40	85	.....	.....	280	70
Berrien	Feb. 18-19	Eau Claire	20	40	100	150	250	.....	203 125	888	127
Branch	Feb. 13-14	Coldwater	214	545	325	426	350	.....	508	2,668	445
Calhoun	Feb. 18-19	Albion	50	50	25	55	97	.....	.....	277	55
Cass	Feb. 11-12	Cassopolis	47	115	157	152	.....	.....	252	905	181
Charlevoix	Dec. 17-18	Charlevoix	39	103	139	32	89	100	.....	502	84
Cheboygan	Dec. 15 16	Cheboygan	12	44	66	12	32	.....	45	211	35
Chippewa	Jan. 27-28	Pickford	150	250	.....	175	275	.....	.....	850	212
Clare	Jan. 5-6	Clare	35	75	350	45	75	.....	75	655	109
Clinton	Jan. 14-15	Elsie	40	100	130	150	160	275	56	911	130
Crawford	Dec. 2-3	Grayling	23	43	35	85	20	.....	20	236	39
Delta	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eaton	Feb. 19-20	Charlotte	40	130	100	180	200	.....	.....	650	130
Emmet	Dec. 19-20	Harbor Springs	54	91	90	58	53	.....	65	411	68
Genesee	Jan. 23-24	Flushing	70	225	260	100	225	.....	.....	880	176
Gladwin	Jan. 28-29	Gladwin	28	78	103	40	80	.....	35	364	61
G'd Traverse	Jan. 28-29	Traverse City	87	175	60	160	125	67	118	792	113
Gratiot	Jan. 16-17	Alma	95	300	80	140	250	.....	268	1,133	189
Hillsdale	Feb. 13-14	Litchfield	106	325	500	325	500	500	.....	2,236	376
Houghton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron	Jan. 28 29	Bad Axe	50	200	150	70	225	200	175	1,070	153
Ingham	Feb. 20-21	Stockbridge	61	120	245	107	165	.....	105	803	134
Ionia	Feb. 12-13	Ionia	194	426	250	318	560	150	.....	1,898	316
Iosco	Jan. 30-31	Tawas City	18	86	51	28	55	.....	28	266	45
Iron*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Isabella	Jan. 21-22	Mt. Pleasant	70	150	150	140	85	.....	378	973	162
Jackson	Feb. 16-17	Grass Lake	50	200	275	140	225	250	.....	1,140	190
Kalamazoo	Jan. 21 22	Richland	90	175	475	150	240	.....	.....	1,130	226
Kalkaska	Dec. 3-4	Kalkaska	20	35	50	40	50	.....	65	260	43
Kent	Jan. 12-13	Sparta	63	139	115	113	164	183	.....	777	128
Lake	Dec. 1-2	Chase	.....	47	108	59	62	85	75	436	73
Lapeer	Jan. 19-20	Lapeer	72	215	264	150	365	.....	.....	1,066	213
Leelanau	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lenawee	Feb. 9-10	Hudson	.....	150	112	154	250	400	160	1,226	204
Livingston	Feb. 16-17	Howell	55	220	295	185	210	.....	180	1,145	191
Luce*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mackinac*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Macomb	Jan. 21-22	Armada	53	150	290	250	240	.....	.....	983	136
Manistee	Jan. 26-27	Copemish	60	100	130	120	183	.....	.....	593	118
Marquette*	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mason	Jan. 9-10	Ludington	23	40	15	42	43	.....	35	198	33

* No county institute society.
† Meeting prevented by an epidemic of smallpox.

COUNTY INSTITUTES WITH DATES AND ATTENDANCE.—*Concluded.*

County.	Date.	Place	Attendance.							Total.	Average per session.
			1st day.			2d day.					
			A. M.	P. M.	Eve.	A. M.	P. M.	Eve.	W.S.		
Mecosta	Jan. 19-20	Remus	50	100	150	60	104	230	108	802	117
Menominee											
Midland	Jan. 9-10	Midland	29	112	50	40	90		125	446	74
Missaukee *											
Monroe	Jan. 23-24	Scofield	62	103	149	84	116			514	103
Montcalm	Jan. 7-8	Howard City	37	93	137	79	114			460	92
Montmorency	Dec. 11-12	Atlanta		9		24	59	71	28	191	38
Muskegon	Jan. 9-10	Montague		46	60	57	103		30	296	59
Newaygo	Jan. 5-6	Fremont	74	159	161	121	139		125	779	130
Oakland	Feb. 18-19	Pontiac	35	129	85	159	265			673	134
Oceana	Jan. 14-15	Shelby	49	64	89	95	110			407	81
Ogemaw	Jan. 13-14	West Branch	15	15	40	20	63		23	176	29
Ontonagon	April 23-24	Ewen		30	150	30	100			310	77
Osceola	Jan. 22-23	LeRoy	75	140	350	140	95		98	898	150
Oscoda	Jan. 14-15	Mio		90	96	34	43		62	325	65
Otsego	Dec. 4-5	Gaylord	16	44	108	20	48		68	304	51
Ottawa	Jan. 16-17	Coopersville	108	219	203	134	259			923	185
Presque Isle	Dec. 8-9	Millersburg	16	39	37	19	49	53	49	262	37
Roscommon *											
Saginaw	Jan. 7-8	Chesaning	19	110	29	50	100	55	156	519	76
Sanilac	Jan. 26-27	Sanilac Center	25	76	220	50	65		30	466	77
Schoolcraft											
Shiawassee	Jan. 12-13	Vernon		92	195	79	82		156	604	121
St. Clair	Jan. 21-22	Port Huron	40	175	290	80	275	300		1,161	193
St. Joseph	Feb. 9-10	Centerville	35	165	250	155	127	325	328	1,385	198
Tuscola	Jan. 30-31	Cass City	40	175	257	75	170		208	925	156
Van Buren	Jan. 17-18	Paw Paw				85	95		137	317	105
Washtenaw	Feb. 11-12	Chelsea	47	150	126	126	134		150	733	122
Wayne	Jan. 19-20	Wyandotte	51	69	104	73	62			355	71
Wexford	Dec. 5-6	Manton	35	119	264	63	134		65	680	113
Round-up	Feb. 24-27	Owosso	150	400	400	425	500	500	700	5,475	498
		Third day	450	950	1,000						
Total										52,181	

* No county institute society.

ONE-DAY INSTITUTES, WITH DATES AND ATTENDANCE.

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.
					A. M.	P. M.	Eve.		
Alcona	E. A. Croman	Curtis	October 28	L A. Colwell	.....	26	.....	92	46
		Spruce	" 31		.....	.....	66		
Alger*	.....	.....	.....	.....	.....	.....	.....	.....	.....
Allegan	W. W. Farnsworth	Pullman	February 2	L. C. Root	41	70	.....	3,204	96
		West Casco	" 3		56	60	43		
		Glenn	" 4		76	175	99		
		Douglas	" 5		35	86	120		
		Ganges	" 6		38	115	125		
		Fennville	" 7		24	72	....		
		Cheshire	" 10		160	258	190		
		Otsego	" 11		62	239	97		
		Martin	" 12		.....	62	97		
	W. H. Gilbert	Watson	" 13		47	51	49		
		Allegan	" 14		62	109	97		
		Hamilton	" 17		26	60	76		
		Hopkins	" 14		.....	100	125		
Alpena	E A. Croman	Ossineke	November 5	Geo. T. Cathro	.....	.....	.....	133	33
		Wilson	" 6		.....	.....	.....		
		Alpena	" 7		.....	7	26		
		Maple Ridge	" 8		.....	18	82		
Antrim	L. J. Post	Milton Center	December 16	T. W. Howard	17	35	.....	172	34
		Eastport	" 17		35	50	.....		
		Bellaire	" 18		.....	35	.....		
Baraga	L. M. Geismar	Baraga	May 15	Ira E. Randall	.....	75	125	200	100

Barry	Thos. Convey	Woodland	January 12	J. F. Edmonds	28	52	30	755	70
		Glass Creek	" 13		32	50	.....		
		Carlton Center	" 14		60	100	.....		
		Quimby	" 15		38	83	.....		
		Dowling	" 16		62	200	.....		
Bay	Peter Voorheis	Eraser	December 17	William McKay	25	65	125	290	48
		Kawkawlin	" 18		.....	25	80		
		Essexville	" 19		.....	20	.....		
Benzie	L. J. Post	Lake Ann	February 2	R. B. Reynolds	10	15	.....	105	21
		Benzonia	" 3		.....	25	.....		
		Frankfort	" 4		25	30	.....		
Berrien	A. M. Welch	Three Oaks	December 16	F. C. Franz	30	50	75	305	61
		Three Oaks	" 17		60	90	.....		
Branch	L. W. Oviatt	Sherwood	January 14	E. E. Lewis	61	103	.....	1,975	164
		Bethel	" 15		140	190	240		
		Kinderhook	" 16		110	165	.....		
		Algansee	" 17		131	230	.....		
		Quincy	" 19		110	250	250		
Calhoun	A. M. Welch	Leroy	January 19	Wm. A. Powell	118	136	.....	1,142	104
		Penfield	" 20		40	70	.....		
		Ceresco	" 21		40	107	.....		
		Eckford	" 22		103	152	.....		
		Tekonsha	" 23		.....	200	.....		
		Burlington	" 24		36	140	.....		
Cass	E. A. Croman	Jones	January 27	Clarence F. Wells	52	78	.....	600	60
		Union	" 28		44	62	.....		
		Adamsville	" 29		80	92	.....		
		Pokagon	" 30		51	56	.....		
		Volnia	" 31		30	52	.....		
Charlevoix	H. S. Earle	Charlevoix	March 18	R. W. Paddock	20	50	70	275	55
		Rock Elm	" 19		60	75	.....		
Chippewa	John A. Love and P. B. Reynolds.	Pickford	March 10	Frank Taylor	.....	130	60	378	63
		Pickford	" 11		40	81	40		
		Rudyard	" 12		.....	27	.....		

* No county institute society.

ONE-DAY INSTITUTES, WITH DATES AND ATTENDANCE.—*Continued.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.
					A. M.	P. M.	Eve.		
Clare	E. A. Croman	Winterfield	November 18	A. R. Canfield	.....	24	.....	66	22
		Harrison	" 19		.....	16	.....		
		Sheridan	" 20		.....	26	.....		
Clinton	N. I. Moore	Duplain	December 17	Chas. Krell	30	75	90	347	69
		Maple Rapids	" 18		40	112	.....		
Crawford	T. G. Adams	Love School House	November 19	John A. Love	12	31	19	203	27
		Benedict " "	" 20		17	26	55		
		Frederick	" 21		.....	19	24		
Eaton	L. E. Lockwood	Potterville	December 2	Geo. A. Perry	.....	25	.....	715	102
		Vermontville	" 3		25	100	.....		
		Brookfield	" 4		40	65	.....		
		Olivet	" 5		160	300	.....		
Emmet	P. B. Reynolds	Bliss	December 11	Mrs. J. L. Morrice	40	64	80	214	49
		Epsilon	" 12		25	35	.....		
Genesee	N. I. Moore	Geneseeville	January 6	A. J. Cox	50	75	150	823	91
		Otisville	" 7		50	100	125		
		Ritchfield	" 8		70	90	113		
Gladwin	J. W. Cochrane	Dale	January 7	H. R. Clarke	25	60	80	165	55
Grand Traverse	N. P. Hull	Elk Lake	December 16	E. O. Ladd	48	52	.....	256	44
		Neal	" 17		43	49	.....		
		Mapleton	" 19		29	35	.....		
Gratiot	N. P. Hull	Breckenridge	January 6	Chas. Vandeventer	.....	60	.....	292	48
		North Star	" 7		.....	36	.....		
		Pompeii	" 8		29	35	.....		
		Middleton	" 9		.....	63	69		

Hillsdale	E. A. Croman	Somerset	January 20	N. I. Moore	.....	90	.....	1,092	136
		North Adams	" 21		140	225	.....		
		South Jefferson	" 22		35	62	.....		
		Camden	" 23		75	225	240		
Houghton	L. M. Geismar	Hancock	May 13	Ira E. Randall	30	35	.....	160	40
		Lake Lindon	" 14		30	60	.....		
Huron	G. A. True	Caseville	Jannary 19	John Harrison	.....	100	100	811	90
		Kinde	" 21		.....	75	125		
		Ubly	" 22		.....	110	160		
	H. B. Cannon	Harbor Beach	March 26-27		34	55, 52	.....		
Ingham	U. P. Hedrick, R. S. Shaw, C. D. Smith, A. Hamlin Smith.	Mason	October 11	R. J. Robb	50	75	.....	440	63
		Alaiedon	" 31		50	75	150		
	R. S. Shaw and Dr. Geo. A. Waterman.	Aurelius	March 19		.....	20	.....		
		Holt	" 20		.....	20	.....		
Ionia	L. W. Oviatt	Orleans	January 27	H. E. Powell	.....	100	.....	475	158
		Lyons	" 28		.....	300	.....		
		Lake Odessa	" 29		.....	.....	.....		
		Saranac	" 30		.....	75	.....		
Iosco	T. G. Adams	Whittemore	January 13	John W. King	12	18	.....	69	17
		Hale	" 14		.....	19	.....		
		Reno	" 15		.....	20	.....		
Isabella	P. B. Reynolds	Herrick	December 19	M. E. Kane	40	75	.....	115	57
Jackson	A. M. Welch	Rives	January 6	N. M. Davis	.....	40	.....	585	65
		Springport	" 7		80	150	.....		
		Parma	" 8		80	175	.....		
		Pulaski	" 9		20	40	.....		
Kalkaska	M. L. Dean	East Boardman	July 15	.....	30	30	.....	85	28
		Leetsville	" 16		.....	25	.....		
Kalamazoo	E. A. Croman	Schoolcraft	July 17	James Anderson	.....	44	.....	.....	.....
		Oshtemo	" 18		.....	.....	.....		
		Alamo	" 19		.....	.....	.....		

ONE-DAY INSTITUTES, WITH DATES AND ATTENDANCE.—*Continued.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.
					A. M.	P. M.	Eve.		
Kent	C. D. Smith	Caledonia	January 17	Geo. F. Richardson	120	286	.....	886	89
	J. N. Stearns	Grand Rapids	December 17		50	85	.....		
	A. M. Welch	Courtland	" 18		65	80	.....		
		Kinney	" 19		50	85	.....		
		Bowne	" 20		25	40	.....		
Lake	J. W. Hutchins	Luther	November 19	W. S. Gordon	.....	32	48	192	32
		Pinora	" 20		.....	7	25		
		Chase	" 21		.....	25	55		
Lapeer	E. A. Croman	Hadley	January 13	Fred Palmerlee	52	131	250	1,180	118
		Dryden	" 14		35	158	.....		
		Imlay City	" 15		26	154	.....		
		North Branch	" 16		20	135	209		
Lenawee	A. M. Welch	Clinton	January 13	Smith Munger	60	250	400	4,363	150
		Macon	" 14		.....	100	.....		
		Tipton	" 15		30	125	140		
		Onsted	" 16		100	150	.....		
		Cement City	" 22		103	150	140		
		Hudson Center	" 23		35	75	.....		
	N. P. Hull	Cadmus	" 24		76	108	.....		
		Ogden Center	" 26		145	500	700		
		Sand Creek	" 27		83	135	95		
		Medina	" 28		45	77	200		
		Rome	" 29		77	95	100		
		Wolf Creek	" 30		.....	69	.....		
Leelanau	N. P. Hull	Keswick	December 18	A. W. Mebert	24	42	.....	66	33
Livingston	P. B. Reynolds	Oak Grove	January 14	Samuel M. Yerkes	18	65	.....	245	49
		Hamburg	" 15		17	70	.....		
		Pinckney	" 16		.....	75	.....		
Luce*									

Mackinac*									
Macomb									
Manistee	A. P. Gray	Arcadia Bear Lake Chief	November 19 " 20 " 21	J. H. Read	 25 25	15 40 85	 	190	38
Marquette*									
Mason	J. W. Cochrane	Scottville Summit	December 16 " 17	Jerome Harmon	12 40	20 40	 	112	28
Mecosta	J. W. Cochrane	Barryton Sylvester	December 19 " 20	Frank M. Williams	30 75	120 125	85 200	625	104
Menominee	Leo. M. Geismar J. W. Cochrane	Menominee Hermansville Nadeau Ingalls	September 3 November 11 " 12 " 13	Magnus Nelson	 	220 52 61 88	 32 59 112	624	89
Midland	Peter Voorheis	Laporte Posyville Crane Hope	December 2 " 3 " 4 " 5	J. W. Cochrane	25 20 15 	60 75 80 40	150 140 100 120	825	75
Missaukee									
Monroe	J. W. Hutchins	Monroe Azalia	December 18 " 19	R. Ingraham	40 85	75 90	 	290	72
Montcalm	N. K. Potter	Trufant	January 6	John H. Arbogast	48	80	50	170	56
Montmorency	John A. Love N. K. Potter	Vienna Hillman	December 13 " 13		9 20	29 48	23 	129	25

* No county institute society.

ONE-DAY INSTITUTES, WITH DATES AND ATTENDANCE.—*Concluded.*

County.	State speaker.	Places.	Dates.	County secretary.	Attendance.			Total.	Average per session.
					A. M.	P. M.	Eve.		
Muskegon	E. A. Croman	Holton Trent Ravenna	December 16 " 17 " 18	A. B. Sumner	28 28	50 28 80	....	214	43
Oakland	N. P. Hull	Ortonville Wixom	February 11 " 12	William Williamson	68 103	188 138	....	497	125
Oceana	Peter Voorheis	Elbridge Cranston	February 12 " 14	C. F. Hale	 75	70 150	90 120	505	101
Ontonagon	.....	.....	.....	W. B. Hatfield	.....	.....	.....	.....	.....
Osceola	L. J. Post N. K. Potter	Hersey Tustin	December 5 " 7	Clifton Bowker	72	110 5	125	312	78
Ottawa	C. D. Smith N. P. Hull	Coopersville Nunica Herrington Forest Grove Zeeland	August 13 December 3 " 4 " 5 " 6	John F. Wildey	24 15 18 25 41	60 25 35 40 53	....	336	33
Presque Isle	N. K. Potter	Onaway Moltke Hagensville	October 27 " 28 " 29	Henry W. Whitelcy.	....	12	30 65 35	142	35
Saginaw	W. A Ellis	Burch Run Spaulding Hemlock City Freeland Freeland	December 15 " 16 " 17 " 18 " 19	E. A. Ellis	30 24 40 45	72 36 60 145 75	48 ..... 100 250 185	850	65

Sanilac	L. E. Lockwood	Croswell	January 6	Noah Davidson	30	150	.....	942	85
		Minden	" 7		44	158	235		
		Greenleaf	" 8		28	37	.....		
		Snover	" 9		31	62	.....		
		Marlette	" 10		29	138	.....		
Schoolcraft	L. M. Geismar	Manistique	January 10	Fred Greenwood	.....	42	48	90	45
St. Clair	W. A. Ellis	Capac	January 12	H. Maurer	50	300	350	2,350	196
		Yale	" 13		75	200	375		
		Blaine	" 14		.....	130	.....		
		Lamb	" 15		64	270	300		
		Berville	" 16		.....	65	200		
Tuscola	W. A. Ellis	Caro	January 20	Ira K. Reid	50	100	.....	880	125
		Millington	" 21		.....	150	.....		
		Fair Grove	" 22		80	150	300		
		Unionville	" 23		.....	50	.....		
Van Buren	E. A. Croman	Gobles	February 10	E. L. Keasey	200	450	450	2,600	236
		Glendale	" 11		78	150	136		
		Keeler	" 12		102	202	.....		
		Decatur	" 13		110	278	450		
Washtenaw	N. P. Hull	Lyndon	January 15	C. L. Foster	53	78	.....	1,349	123
		Ann Arbor	" 16		37	98	.....		
		Webster	" 17		66	102	123		
	C. D. Smith	Salem	" 30		110	160	.....		
	N. P. Hull	Stony Creek	February 13		215	307	.....		
Wayne	J. W. Hutchins	Belleville	March 13	R. Graden	55	180	400	995	199
		"	" 14		160	200	.....		
Wexford	N. K. Potter	Pleasant Lake	January 8	Wm. Rose	.....	26	.....	354	39
		Harrietta	February 17		13	100	14		
	T. G. Adams	Clam Lake	" 19		18	36	.....		
		Harris School House	" 20		50	55	82		
Totals								38,880	.....

INDEX.

INDEX.

	Page
Adams, Henry C., Trusts	102
Alfalfa	89
Allen, E. P., Chairman Good Roads Session	34
Anderson, David, Practical Law Points	165
Angell, Pres. James B., The Farmer and Education	137
Apple Scab	58
Attendance, County Institutes	176
Attendance, One-day Institutes	178
Azeturia	101
Barrows, W. B., Some Michigan Insects	54
Beef Products, R. S. Shaw	129
Beet Pulp	91.
Black Knot of Plum	57
Black Knot of Grape	57
Bliss, Aaron T., Governor, Member State Board of Agriculture	2
Bliss, Aaron P., Member of the State Board of Agriculture	2
Bogue, Prof. E. E., Methods of Reforesting Cut-over lands in Michigan	68
Brewster, Prof. J. H., The Torrens System of Land Transfer	109
Bright, Orville T., Rural Schools as They are and as They Should Be	141
Bristol, O. L., County Commissioner of Schools, Chairman	141
Brown, A. M., A. B., Secretary State Board of Agriculture	2
Brown, A. M., Secretary State Board of Agriculture, Chairman	85
Brown Rot of Peach, Plum and Cherry	57
Buell, Miss Jennie, What Do We Work For	154
Butterfield, Pres. K. L., The Rural School and the Farm Community	141
Butterfield, Kenyon L., A Campaign for Rural Progress	103
Butterfield, I. H., Secretary State Agriculture Society, Chairman	125
Campbell, Mrs. Emma A., The Perplexities of the Housewife	159
Centralized School, A. E. Palmer	135
Chandler, A. L., Pres. Shiawassee County Institute Society, Chairman	13
Choking	100
Civic Improvement	52
Clover Still in the Lead	89
Colic	100
Commercial Stock Feeds	90
Committee on Resolutions, Report of	136
Concentrated Feeds and Forage Plants, New, Prof. C. D. Smith	88
Connecticut Road System, James H. MacDonald	35
Contagious Diseases	101
Cook, E. J., Chairman Sugar Beet Section	20
Cook, Mrs. E. J., Pres. Women's Congress	154
Cooley, Prof. C. H., The Indeterminate Sentence for Crime	113
Cow Pea	90
Cow Pox	98
Craig, Prof. John, Home Decoration and Civic Improvement	50

	Page
Craig, Prof. John, Orchard Management	25
Crime, The Indeterminate Sentence for, C. H. Cooley	113
Dairy Cow, C. S. Plumb	116
Dairy Cow, Diseases of the, G. W. Dunphy	96
Dairy Cow, The Feeding of the, Colon C. Lillie	124
Dairy Herd, Building up the, J. W. Helme	121
Dairy Session	116
Davis, B. F., Treasurer State Board of Agriculture	2
Davis, Chas A., The Forest Plantation	77
Derham, C. H., Harvesting the Beet Crop	24
Diseases of Plants, Some Fungous, B. O. Longyear	55
Dogs and Sheep	172
Drainage	165
Dunphy, Dr. G. W., Diseases of the Dairy Cow	96
Earle, Horatio S., A Comparison of Highway Systems	37
Education for Girls, Practical, Miss Maude Gilchrist	156
Ethics of the Farm, C. J. Monroe	32
Facts and Figures Regarding Beet Sugar Manufacture, F. R. Hathaway	13
Farm Wood-lot, Geo. B. Horton	73
Farmer and Education, Pres. Jas. B. Angell	137
Farmers Side of the Beet Sugar Industry, Colon C. Lillie	18
Fertility Question	26
Forage Plants and Concentrated Feeds, New, Prof. C. D. Smith	88
Forest Plantation, Chas. A. Davis	77
Forestry Reserve to Contiguous Country and Population, Benefit of, F. E. Skeels	70
Forestry Session	59
French, Walter H., Deputy Supt. of Public Instruction, Chairman	137
French, Prof. W. H., The Schoolroom	151
Fruit Grower and the Canning Factory, R. D. Graham	31
Fruit Section	25
Fungous Diseases of Plants, B. O. Longyear	55
Garfield, Chas. W., Need and Importance of Reforestation in Michigan	59
Garget	99
Gilbert, W. H., The Cultivation and Care of Sugar Beets	23
Gilchrist, Miss Maude, Practical Education for Girls	156
Graham, R. D., The Fruit Grower and the Canning Factory	31
Graham, R. D., Chairman	59
Graham, R. D., Member of State Board of Agriculture	2
Hale, C. F., Pres. State Horticultural Society, Chairman	25
Harvesting the Beet Crop, C. H. Derham	24
Hathaway, F. R., Facts and Figures Regarding Beet Sugar Manufacture	13
Helme, Hon. J. W., Building up the Dairy Herd	121
Hen on the Farm, C. A. Waldron	82
Highways, Building and Maintaining, Frank F. Rogers	41
Highway Systems, A Comparison of, Horatio S. Earle	37
Home Decoration and Civic Improvement, Prof. John Craig	50
Horse, Diseases of the, H. F. Palmer	99
Horton, Geo. B., Master State Grange, Chairman	102
Horton, Geo. B., The Farm Wood-lot	73
Hubbell, J. J., Reforesting Cut-over Lands	66
Humus Needed in Orchard Soils	26
Influence of Home Surroundings in the Building of Character, Mrs. Carrie Ives Saunders.	163
Insects, Some Michigan, W. B. Barrows	54
Institutes, Dates and Attendance	176
Institutes, Officers	174
Institute, Round-up, Report of	13

	Page
Jeffery, Prof Jas. A., The Puddling of Soils	85
Kedzie, Robert Clark, Obituary	9
Land Transfer, The Torrens System of, J. H. Brewster	109
Large Milk Records	117
Law Points, Practical, David Anderson	165
Letter of Transmittal, L. R. Taft	3
Lillie, Colon C., The Feeding of the Dairy Herd	124
Lillie, Colon C., The Soil for the Beet Field—Its Preparation and Planting	21
Lillie, Colon C., The Farmers' Side of the Beet Sugar Industry	18
Longyear, B. O., Some Fungous Diseases of Plants	55
Lung Worms	95
Lyford, Miss Carrie A., Substitutes for Meats	162
MacDonald, James H., The Connecticut Road System	35
Mayo, Mrs. Mary A., Obituary	11
Milk Fever	97
Monroe, C. J., Chairman	50
Monroe, Hon. C. J., Ethics of the Farm	32
Monroe, Chas J., Member of State Board of Agriculture	2
Nodular Disease of Sheep	94
Obituary, Robert Clark Kedzie	9
Obituary, Mary A. Mayo	11
Orchard Management, Prof. John Craig	25
Palmer, A. E., Construction and Care of Clay Roads	48
Palmer, Hon. A. E., The Centralized School	135
Palmer, Dr. H. F., Diseases of the Horse	99
Parasitic Diseases of Sheep, Geo. A. Waterman	92
Partition Fences	168
Perplexities of the Housewife, Mrs. Emma A. Campbell	159
Plumb, C. S., Profitable Pork Production	125
Plumb, C. S., The Dairy Cow	116
Political Science Session	102
Pork Production, Profitable, C. S. Plumb	125
Presidents and Secretaries of County Institutes	174
Pruning Question	29
Puddling of Soils, J. A. Jeffery	85
Reforesting Cut-over Lands in Michigan, Methods of, Prof. E. E. Bogue	68
Reforesting Cut-over Lands, J. J. Hubbell	66
Reforestation in Michigan, Need and Importance of, Chas. W. Garfield	59
Relation of the Factory to the Farmer, Perry G. Towar	14
Report of Superintendent	5
Report of the Round-up Institute	13
Report of the Committee on Resolutions	136
Resolutions, Report of Committee on	136
Roads, Clay	44
Roads, Construction and Care of Clay, A. E. Palmer	48
Roads, Earth	43
Roads, Gravel	46
Roads, Sand	45
Roads, Sand-clay	45
Rogers, Frank F., Building and Mantaining Highways	41
Rural Progress, A Campaign for, Kenyon L. Butterfield	103
Rural Schools as They Are and as They Should Be	141
Rural School and the Farm Community, K. L. Butterfield	141
Rural School Problem, Pres. J. L. Snyder	148

Page

Saunders, Mrs. Carrie Ives, The Influence of Home Surroundings in the Building of Character 163
Schoolroom, Prof. W. H. French 151
Secretaries and Presidents of County Institutes 174
Shaw, Prof. R. S., Beef Products 129
Sheep Feeding at M. A. C., Experimental, W. P. Snyder 133
Sheep, Parasitic Diseases of, Geo. A. Waterman 92
Shot-hole Fungus of Plum and Cherry 58
Simmons, J. W., Supt. of Owosso Schools 137
Skeels, F. E., Benefit of Forestry Reserve to Contiguous Country and Population 70
Smith, Prof. C. D., New Forage Plants and Concentrated Feeds 88
Snyder, Jonathan L., A. M., Ph. D., President of the College 2
Snyder, Pres. J. L., The Rural School Problem 148
Snyder, Pres. J. L., The Preparation of Teachers for the Rural Schools 138
Snyder, W. P., Experimental Sheep Feeding at M. A. C 133
Soil for the Beet Field—Its Preparation and Planting, Colon C. Lillie 21
Soy Beans 90
Spraying Question 28
State Board of Agriculture 2
Stinking Smut of Wheat 58
Stock Feeding Session 125
Stomach Worm 92
Strawberry Leaf-spot 57
Substitutes for Meats, Carrie A. Lyford 162
Sugar Beet Section 21
Sugar Beets, The Cultivation and Care, W. H. Gilbert 23

Taft, L. R., Letter of Transmittal 3
Taft, L. R., Report of Superintendent 5
Taft, L. R., Superintendent of Institutes 2
Tape Worm 94
Teachers for Rural Schools, The Preparation of, Pres. J. L. Snyder 138
Teachers' Institute 141
Telephones 172
Torrens System of Land Transfer, J. H. Brewster 109
Towar, Perry G., The Relation of the Factory to the Farmer 14
Trespass of Animals 169
Trusts, Henry C. Adams 102
Tuberculosis 96

Vetch 90
Veterinary Session 92

Waldron, Dr. C. A., The Hen on the Farm 82
Wallace, W. H., Member of State Board of Agriculture 2
Warner, Fred M., Pres. State Dairymen's Association, Chairman 116
Waterman, Dr. Geo. A., Parasitic Diseases of Sheep 92
Watkins, L. Whitney, Member of State Board of Agriculture 2
Wells, Franklin, Pres. State Board of Agriculture 2
What Do We Work For? Miss Jennie Buell 154
What the State Can Do, E. A. Wildey 62
Wildey, Hon. E. A., What the State Can Do 62
Women's Congress 154
Wood-lot, The Farm, Geo. B. Horton 73
Wounds 101

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